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Phase I Wildlife Overview for the Oldman River Dam Environmental Mitigation/Opportunities Plan

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PHASE I WILDLIFE OVERVIEW FOR THE OLDMAN RIVER DAM ENVIRONMENTAL MITIGATION / OPPORTUNITIES PLAN

Alberta Environment
Planning Division

D.A. Westworth and L.M. Brusnyk

D.A. Westworth & Associates Ltd.
Edmonton, Alberta

March 1985

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EXECUTIVE SUMMARY

As part of Alberta Environment's continued planning for development of the Oldman River Dam, D.A. Westworth & Associates Ltd. were asked to prepare a Phase 1 Wildlife Overview report for the project area. The report includes a review of existing information on the wildlife resources of the Three Rivers site, summarizes potential impacts and mitigation strategies that have been identified to date, and identifies major data gaps and required studies.

The project area is transitional between prairie grassland and montane ecoregions. Natural habitats within the 2350 ha reservoir area include riparian forest and shrub communities associated with the relatively narrow floodplains of the Oldman, Crowsnest and Castle Rivers, and grasslands and shrub communities associated with the valley slopes. Adjacent uplands contain native grasslands interspersed with cultivated lands. A detailed habitat inventory of the project area has not yet been conducted and there is a remaining need for accurate, large scale mapping of the affected habitat.

The most important issue with respect to the impact of the project on wildlife, concerns the effects of habitat loss on local and regional ungulate populations. Portions of the project area have been identified as critical habitat for mule deer and white-tailed deer. An aerial survey of the damsite and lower reservoir area in January 1982 indicated that this portion of the Oldman River valley provides important winter habitat for mule deer, with an observed density of approximately 5.7 mule deer per sq km. For most of the project area however, data on the abundance and seasonal distribution of ungulates are lacking. As a result, it is not known whether the area provides critical seasonal habitat for animals inhabiting surrounding areas or whether these valley segments are important as movement or migration corridors for ungulates. Surveys are required to determine seasonal habitat use and present habitat suitability within the project area and within adjacent habitat areas that are likely to be affected by the project.

With the exception of coyote and red fox, capability of the area for most commercially important species of furbearers is considered low. The area currently receives a limited amount of trapping activity, although the amount of fur harvested is not known. Required studies include: determining the commercial value of fur harvested in the project area, identifying carnivore denning areas that

would be affected by the project, and determining the status of the long-tailed weasel, a species that now occurs on the endangered species list.

The capability of the area for waterfowl production is very low due to the high velocities of the rivers and the lack of permanent wetlands in the surrounding uplands. The major concern is the potential loss of nesting habitat for Canada geese. Geese are known to nest on islands and ledges along this portion of the Oldman River, although the extent of nesting habitat and amount of goose production in the project area has not been determined. Surveys are required to quantify use of the area by geese and to determine the availability of alternative, unoccupied nest sites upstream and downstream from the reservoir area.

While a number of raptor species are known to nest in the general area, the major concern is the loss of prairie falcon nest sites within the project area. Although the prairie falcon is not considered endangered, this species is on the COSEWIC status list and is closely monitored by provincial and federal wildlife agencies. Four known nest sites are situated in areas that may be affected by the project. Surveys are required to determine which of the active nest sites are at risk and to develop mitigation strategies for securing existing nest sites or providing alternate nest sites.

The status of other terrestrial bird species in the project area is largely unknown. Sharp-tailed grouse are the only upland game bird species expected to make extensive use of the proposed reservoir area. Surveys are required to determine whether any dancing grounds occur within areas that might be affected by the project. Surveys were also recommended to evaluate the importance of affected habitats for songbirds, since this group of birds are an increasingly important recreational resource and riparian cottonwood communities have been widely recognized as exceptionally productive avian habitats.

No information exists on the abundance or distribution of herpetofauna in the project area. Species of potential concern are the northern leopard frog and western painted turtle, which are currently considered threatened or endangered in Alberta. Surveys are recommended to determine the status of these species in the project area, and to determine whether any hibernacula for garter snakes are at risk with respect to the project.

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1.0 INTRODUCTION

Following an evaluation of a number of alternative sites, the Government of Alberta announced its decision to construct a dam at the Three Rivers site on the Oldman River on August 8, 1984. The dam is required to provide a dependable water supply for various uses, and to allow expansion of irrigation in southern Alberta. Construction of the project is scheduled to begin in 1986.

In January 1985, D.A. Westworth & Associates Ltd. was requested by Alberta Environment, Planning Division to conduct a Phase 1 Wildlife Overview for the Oldman River Dam Project. The Phase 1 Overview is a compilation and review of all existing information on the wildlife resources of the project area. This overview will comprise one component of an Environmental Mitigation/ Opportunities Plan being prepared by the Planning Division as part of the overall Environmental Impact Assessment for this project.

1.1 OBJECTIVES

The overall objective was to compile an overview of all existing wildlife information for the areas potentially impacted by the Oldman River Dam. Specific objectives were to:

1. Compile and review all existing information on important recreational and rare and endangered species within the study area.

2. Identify and document existing traplines and their use.

3. Collect and review all existing information on ungulate winter ranges, their condition and use (population numbers and trends).

4. Review existing information on movement patterns of ungulates in the reservoir area.

5. Describe the importance of the reservoir sites for ungulates in comparison to upstream and downstream areas and any access problems in the reservoir area that have been identified to date.

6. Summarize potential impacts to the wildlife resource that have been identified to date.

7. Summarize possible mitigation scenarios that have been identified to date.

8. Identify major data gaps and outline required studies to fill these gaps.

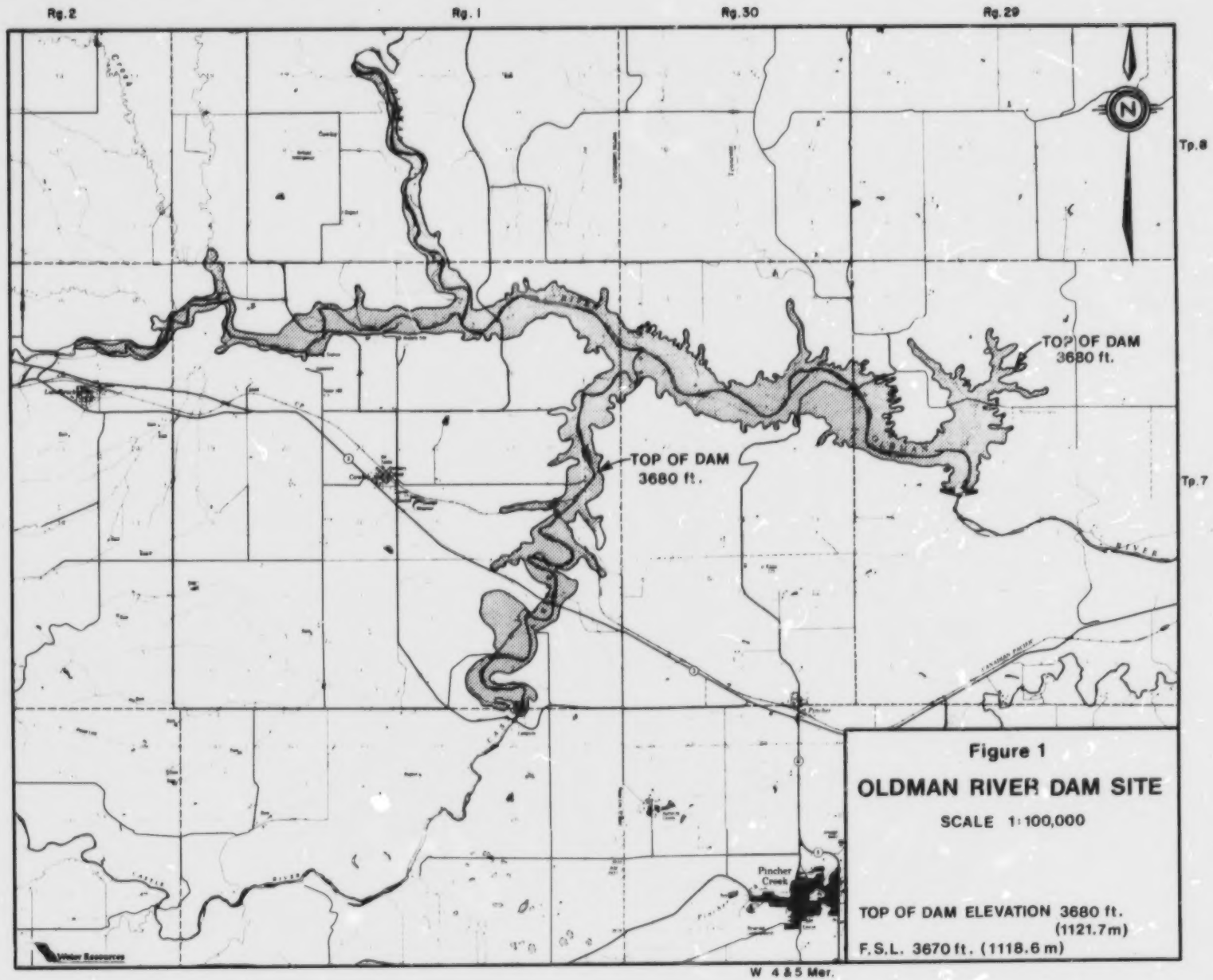
2.0 STUDY AREA

The Three Rivers study area is located approximately 8 km northwest of Pincher Creek, Alberta (Figure 1). The dam site, which is located on the Oldman River below its confluence with the Crowsnest and Castle Rivers, is expected to flood about 2350 ha of land, including the lower portions of the Castle and Crowsnest river valleys.

The study area falls within the Fescue Grass Ecoregion of Alberta and contains both plains and foothills topography (Strong and Leggat 1981). As the smallest grassland region in Alberta, the Fescue Grass Ecoregion is considered transitional between the Mixed Grass and Aspen Parkland Ecoregions throughout most of its distribution in Alberta. However, this ecoregion also borders the Montane Ecoregion in the vicinity of the Three Rivers dam site. Because of its proximity to the Rocky Mountains and the higher elevations associated with foothills topography, climatic conditions in the Fescue Grass Ecoregion are not typical of prairie climates. Instead, this ecoregion typically has lower summer temperatures and higher winter temperatures than other grassland regions in Alberta (Strong and Leggat 1981).

Vegetatively, the subhumid climate conditions promote the growth of graminoid species, however much of the upland area in the Three Rivers study area is under cultivation (Vriend and Clark 1975). On undisturbed plains, rough fescue (**Festuca campestris** Rydb.) and parry oat grass (**Panthonia parryi** Scribn.) are the dominant native grass species while june grass (**Koeleria gracilis** Pers.), chickweed (**Cerastium** spp.), sticky purple geranium (**Geranium viscosissimum** Fisch and Mey.) and sage (**Artemisia** spp.) are among the more common herbs (Strong 1979, Strong and Leggat 1981). Tree and shrub communities become increasingly important as moisture availability increases. This is especially true on north-facing slopes, coulees, creek and river bottoms and as one proceeds westward. Increased moisture availability generally results from delayed snowmelt, reduced evaporation and/or seeping groundwater (Strong and Leggat 1981). Typical shrub species in these areas include: alder (**Alnus** sp.), saskatoon (**Amelanchier alnifolia** Nutt.), willow (**Salix** spp.) and chokecherry (**Prunus** spp.) (Vriend and Clark 1975). Common tree species include: aspen (**Populus tremuloides** Michx.), balsam poplar (**P. balsamifera** L.) and cottonwood (**P. deltoides** Marsh.).

Physiographically, the western portion of the study area falls within the Western


Rg.2
Rg.1
Rg.30
Rg.29
Tp.8
Tp.7
TOP OF DAM
3680 ft.
TOP OF DAM
3680 ft.
Pincher Creek
W 4 & 5 Mer.
Figure 1
OLDMAN RIVER DAM SITE
SCALE 1:100,000
TOP OF DAM ELEVATION 3680 ft.
(1121.7m)
F.S.L. 3670 ft. (1118.6 m)

Alberta Plains Physiographic Region of Alberta (Karpuk and Levinsohn 1980). The topography is typically level to gently undulating. Orthic Black Chernozems are the dominant soil group on the grasslands. The flood plains of the Oldman and Crowsnest Rivers and their tributaries are comprised primarily of recently deposited Cumulic Regisols nearer to the channels and Orthic Black Chernozems further away from the channels (Karpuk and Levinsohn 1980). Soil textures are primarily silty loams, however gravelly deposits frequently occur within and adjacent to streams and rivers.

The Three Rivers study area is drained by the Crowsnest, Castle and Oldman Rivers and their tributaries. These rivers and creeks all flow into the Oldman River, which eventually enters the South Saskatchewan River system. Apart from a few small lakes scattered to the west and south, no other major waterbodies occur in the immediate vicinity of the study area.

Meteorological information from Cowley, Alberta indicates that the mean annual daily temperature is 3.9°C, however mean daily temperatures range from -10.1°C in January to 15.8° in July (Environment Canada 1982). The respective annual summer and winter precipitation values are 316 mm and 233 mm. The average frost-free period is 90 days but ranges from 25 to 110 days (Strong and Leggat 1981).

The principal land use in the area consists of farming, and as a result, much of the land is under cultivation. Grazing is the major land use on native grasslands. River valleys, creek bottoms and coulees are used for various outdoor recreation activities and some limited trapping.

3.0 METHODS

The wildlife overview was prepared from a review of available published and unpublished maps and reports obtained from federal, provincial and university libraries. It included relevant consulting reports and file data collected by the Alberta Fish and Wildlife Division and Canadian Wildlife Service. Biologists who have worked in the area and other knowledgeable people in the private and public sectors were contacted for additional information on wildlife populations and habitat conditions at the Three Rivers site. Information is presented on base maps prepared by Alberta Environment.

4.0 WILDLIFE RESOURCES OF THE THREE RIVERS SITE

4.1 HABITAT

Several sources of information exist on wildlife habitat in the vicinity of the proposed Three Rivers Reservoir. Moss (1944) described broad vegetation patterns at the association level in the general area of the proposed reservoir site and delineated four major vegetation communities. These included the rough fescue-parry oat grass community, the shrubland community, the coniferous forest community and the bottomland poplar community.

Vriend and Clark (1975) identified five vegetative communities in the Three Rivers study area. These communities included deciduous bottomlands, deciduous valley slopes, coniferous forests, grasslands and cultivated lands. The vegetation assessment however, was based on limited field observations and on aerial photograph interpretation (scale unknown).

Keith-Angus Butler (1975) also conducted a brief reconnaissance of the study area. They reported that the vegetation communities present in the Oldman and its tributaries are fairly uniform throughout the system. The valley vegetation was dominated by various tree species, while the adjacent uplands were comprised primarily of native grasses interspersed with cultivated cereal crops and grasses. Grasslands within the valley system predominate on steeper south-facing slopes where growing conditions are fairly dry.

Horejsi et al. (1978) reviewed existing literature in the general area of the proposed reservoir but no field work was conducted. Prism (1982) briefly surveyed the study area in 1981 and in conjunction with using 1976, 1:31,680 aerial photography, mapped nine different habitat types. Based on this information, 68% of the Three Rivers site is comprised of grassland while 13% is characterized by forested or shrubby areas. Most of the grasslands occurred on steep south-facing slopes within the river valley, while trees and shrubs were typically associated with valley bottoms (Prism 1982).

Based on the above studies, there appear to be five broad habitat types in the Three Rivers area. These include forested bottomlands of the river valley, shrubby valley slopes, grassy valley slopes, grasslands and cultivated lands. The forested bottomlands are dominated by such deciduous species as aspen, balsam poplar and

cottonwood. Willow and alder appear to be common species occupying the shrub layer. Further west along the Crowsnest River, an increase in the presence of such coniferous species as Douglas fir (**Pseudtsuga menziesii** (Mirb.) Franco), limber pine (**Pinus flexdis** James) and lodgepole pine (**P. contorta** Dougl. var. **latifolia** Engelm) occur along steeper, moister north-facing slopes. The shrubby valley slopes are somewhat drier than the bottomlands and consequently support woody species that are more suited to drier site conditions. These include chokecherry, saskatoon, buckbrush (**Symphoricarpus occidentalis** Hook.) and silver-berry (**Eleagnus commutata** Bernh.). Grassy valley slopes typically occur on exposed south-facing slopes that receive increased solar insolation and strong winds, resulting in xeric site conditions. Typical species that likely occur in these areas include rough fescue, Idaho fescue and parry oat grass. Native grasslands also occur on upland sites adjacent to the river valleys. Species composition is expected to be similar to that observed on the grassy valley slopes. The last type includes cultivated lands which also occur on the level uplands adjacent to the proposed reservoir and appears to be largely comprised of cereal crops.

Although four published reports on vegetation communities exist, most of this information is of a superficial nature. No field sampling has been conducted, nor has any adequate habitat mapping been undertaken. Habitat maps that do exist were based on fairly old, small scale aerial photographs, resulting in a limited amount of useful information which could be used for assessing possible impacts on wildlife habitat.

4.2 MAMMALS

Forty-two mammalian species are expected to occur in the Three Rivers area (Appendix I). Of these, 21 species are likely to exhibit sporadic distributions, either because they are at the limit of their ranges or because suitable habitat for the species only occurs in widely distributed clumps within the study area. The long-tailed weasel and the American badger are species that may occur in the vicinity of the proposed reservoir site that are considered endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 1982). None of the species listed in Appendix I are unique to the Three Rivers site.

4.2.1 Ungulates

4.2.1.1. Key Areas and Capability Classification

Portions of the future reservoir area have been designated as key areas for deer by the Fish and Wildlife Division (Alberta Energy and Natural Resources 1981a, 1981b). The Fish and Wildlife Division defines key areas as "habitat areas that are critical to a significant number of individuals of a species during at least part of the year". These areas include the portion of the Oldman River valley between the damsite and the confluence with the Castle River, which is indicated as critical habitat for mule deer and white-tailed deer, as well as a portion of the Castle River, which is identified as critical mule deer habitat (Figure 2). The Oldman River valley downstream of the damsite is considered a key area for white-tailed deer and mule deer. Large areas of key habitat for mule deer also occur upstream of the reservoir on the Crowsnest River and in the southern Porcupine Hills to the north of the reservoir area.

High ratings were similarly given to much of the area by the Canada Land Inventory (C.L.I. 1972, 1973a). The Oldman River valley upstream of the damsite is rated as Class 2W, high capability lands which provide winter range for deer. The Castle River valley received the highest capability rating of 1W as winter range for deer. The Oldman River valley downstream of the damsite is also rated Class 1W for deer. The portion of the Crowsnest River valley in the reservoir area is rated moderately high (Class 3) for production of deer and elk.

4.2.1.2 Abundance and Distribution

Information on species occurrence, abundance and distribution of ungulates in the area is available from aerial surveys conducted by the Fish and Wildlife Division between 1975 and 1982. Vriend and Clark (1975) conducted an initial aerial survey of the Three Rivers site in March 1975. In 1978 the Fish and Wildlife Division initiated a deer survey program for the southern foothills region, which included a number of survey blocks in the vicinity of the Three Rivers site (Figure 3). These surveys were conducted by helicopter in mid-winter (January). In 1978, survey conditions were rated good to excellent (Gudmundson 1978) and the survey yielded reliable population estimates for the survey blocks. The foothills deer survey was repeated in January 1980, however poor survey conditions resulting from a lack of normal snowfall forced cancellation of the survey before all blocks were completed

Rg. 2
Tp. 9
Tp. 8
Tp. 7
Tp. 6
MD
M
MD
M
M
M
E
MD
WO
WO
Rg. 2

Rg. 2 Rg. 1 Rg. 30 Rg. 29 Rg. 28 Rg. 27

Tp. 9 Tp. 8 Tp. 7 Tp. 6

PORCUPINE HILLS

AN INDIAN RESERVE 147B

MD
E
M
WD

Figure 2
Wildlife Key Area Map
Three Rivers Site
(Source: Alberta Fish and Wildlife Division, 1981)

MD	Mule Deer
WD	White-Tailed Deer
M	Moose
E	Elk

SCALE 1: 125,000

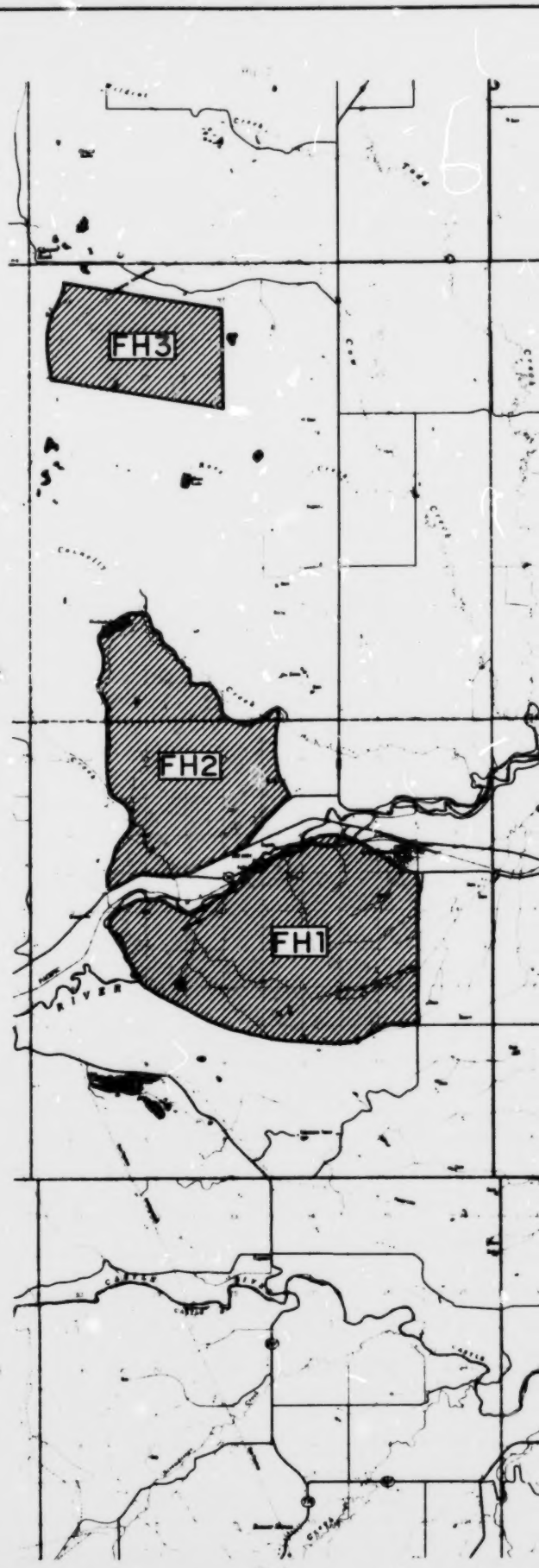
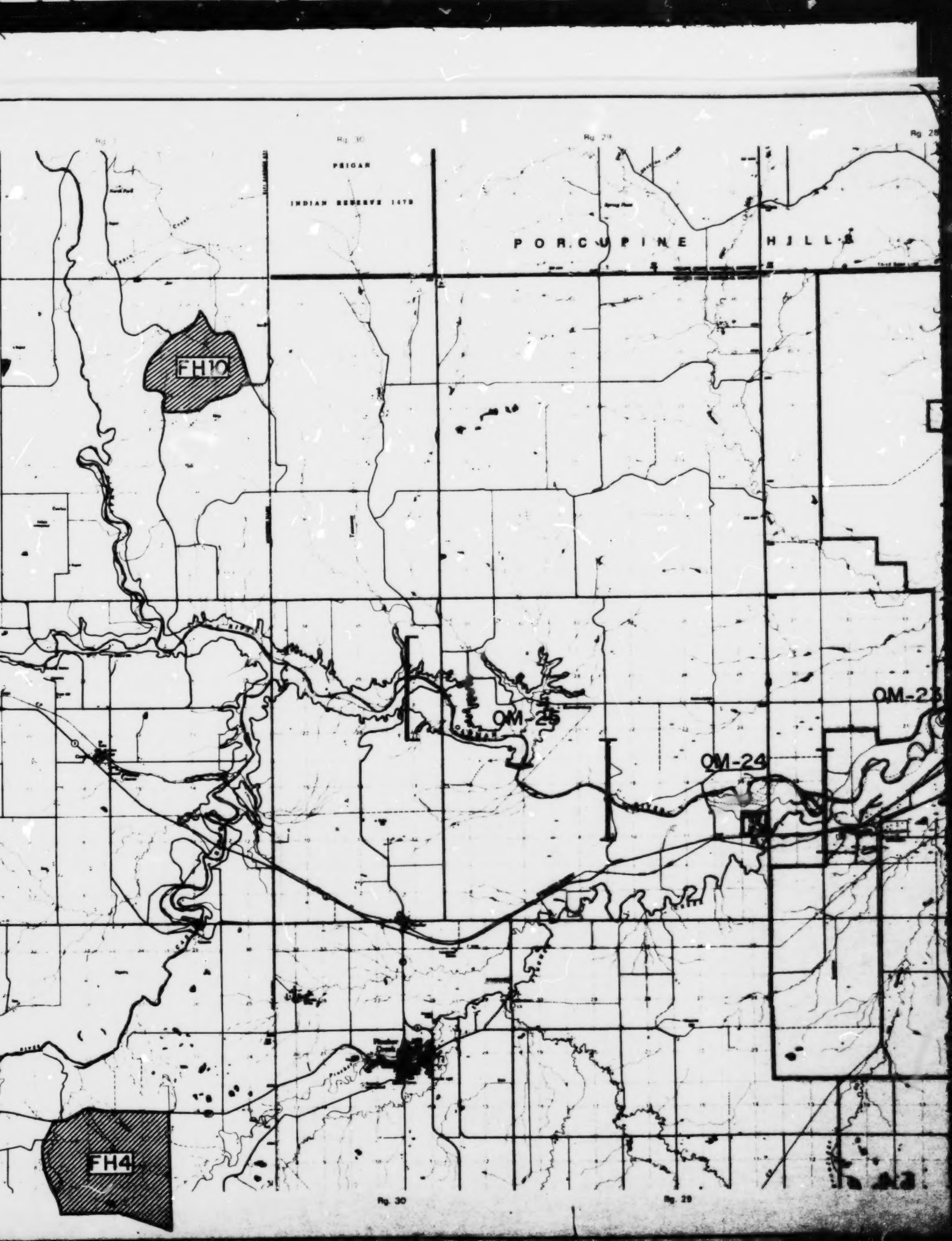


Fig. 2


PEIGAN
INDIAN RESERVE 147B
PORCUPINE HILLS
FH10
FH4
OM-25
OM-24
OM-23
Rg. 30
Rg. 29

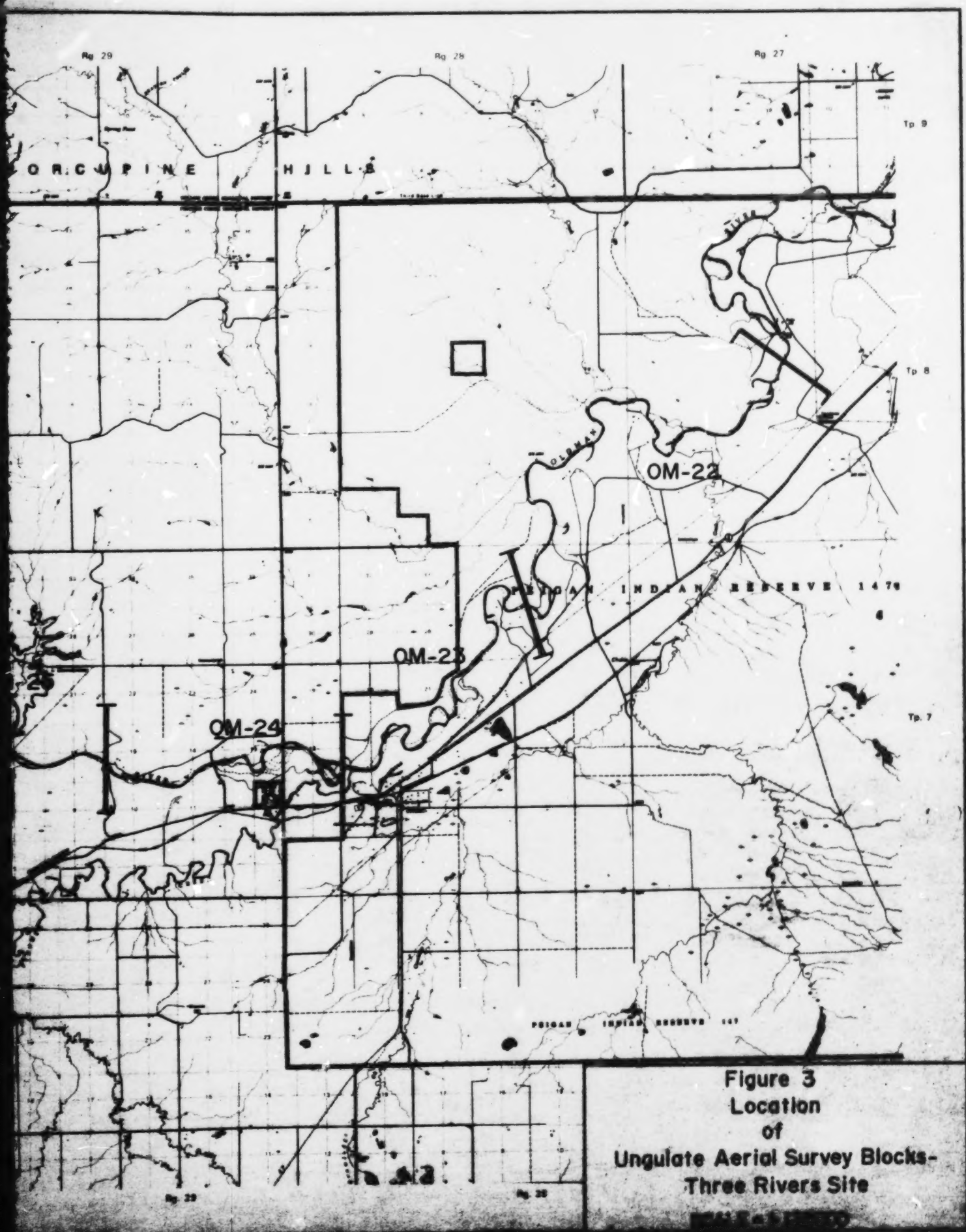


Figure 3
Location
of
Ungulate Aerial Survey Blocks-
Three Rivers Site

(Gudmundson 1980). Survey blocks in the vicinity of the Three Rivers site were among those that were completed, however the population estimates may have been affected by the poor survey conditions. In 1981-82, the Fish and Wildlife Division began another aerial census program designed to monitor the status of deer populations along major rivers in the southwestern prairie region (Gudmundson 1982). This program provided complete aerial coverage by helicopter of the Oldman River valley between Lethbridge and a point approximately 5 km upstream of the Three Rivers damsite. One of the survey segments (OM-25) corresponds to the damsite area and lower portion of the proposed reservoir (Figure 3).

Based on their initial survey in March 1975, Vriend and Clark (1975) reported a minimum winter population of 19 mule deer for the Three Rivers reservoir area, although they acknowledged this figure as an underestimate. From interviews with landowners in the area, they estimated the spring, summer and fall mule deer population to be approximately 70 deer. They concluded that most of the deer were migrating out of the river valley to winter in the Porcupine Hills or the foothills west of the reservoir site.

Subsequent surveys conducted by the Fish and Wildlife Division show much higher winter ungulate densities in the area (Table 1). In 1978, mule deer densities in the five foothills survey blocks in the vicinity of the Three Rivers site ranged from 4.3 deer per sq km (11.2 per sq mi) in FH10 to 24.4 deer per sq km (63.2 per sq mi) in FH2. Densities were generally lower during the 1980 survey, indicating either lower observability due to the poor survey conditions or a more dispersed mule deer population resulting from the mild winter weather and shallow snow cover. Numbers of other ungulate species recorded on the foothills survey blocks were much lower (Table 1). It is interesting to note that while both moose and elk appear to be moderately abundant in the foothills west of the reservoir site, white-tailed deer were not recorded during either the 1978 or 1980 surveys.

Large numbers of deer were also recorded during the river valley surveys conducted during January 1982 (Table 1). Survey section OM-25, which includes the damsite and downstream part of the proposed reservoir, contained 97 mule deer. Densities are generally not calculated for this type of survey because of the variable width of the river valley. However, for purposes of comparison with survey data available for the area immediately upstream of the reservoir site, a survey area of approximately 17 sq km was calculated which yields a density of around 5.7 mule

Table 1. Numbers and density (no/sq km) of ungulates observed on Fish and Wildlife Division survey areas located in the vicinity of the Three Rivers site, 1978-82.

Survey Block	Area (sq km)	Date	Mule Deer		White-tailed Deer		Moose		Elk	
			No.	Dens.	No.	Dens.	No.	Dens.	No.	Dens.
FH 1	18.13	Jan 1978	262	14.5	0	-	8	0.4	22	1.2
		Jan 1980	73	4.0	0	-	3	0.2	8	0.4
FH 2	12.95	Jan 1978	316	24.4	0	-	0	-	0	-
		Jan 1980	255	19.7	0	-	2	0.2	0	-
FH 3	7.77	Jan 1978	88	11.3	0	-	9	1.2	0	-
		Jan 1980	129	16.6	0	-	6	0.8	58	7.5
FH 4	11.00	Jan 1978	65	5.9	0	-	0	-	0	-
		Jan 1980	39	3.5	0	-	3	0.3	0	-
FH 10	5.83	Jan 1978	25	4.3	0	-	0	-	0	-
		Jan 1980	39	6.7	0	-	0	-	0	-
OM-22		Jan 1982	0		19		0		0	
OM-23		Jan 1982	0		33		0		0	
OM-24		Jan 1982	4		15		0		0	
OM-25		Jan 1982	97		0		0		0	

deer per sq km (15 per sq mi). Downstream of the damsite mule deer decrease abruptly in abundance and are replaced by white-tailed deer, which was the only species recorded on survey sections within the Peigan Indian Reserve.

The only other available information on ungulate populations in the area, that we are aware of, is contained in a report by Horejsi et al. (1978). They did not census winter ungulate populations on the Three Rivers site, however they provide results of an aerial survey of a known winter range located north of Lundbreck Falls and 6.5 km west of the upstream end of the proposed reservoir. They report observing 310 mule deer in a 13 sq km area on 23 February 1978. This represents a density of 23.9 deer per sq km. Although the authors do not include a map showing the survey area, the description appears to correspond to the Fish and Wildlife Division survey block FH2, which contained a density of 24.4 mule deer per sq km on 14 January 1978. They felt that these animals would disperse to surrounding areas, including the Oldman River valley in spring and summer. Horejsi et al. (1978) concluded that the Three Rivers site provided excellent spring mule deer range. They recorded 70 mule deer during an 'incomplete ground reconnaissance' conducted in late April 1978 and indicate the liklihood that there were twice as many deer present at the time.

Several conclusions can be drawn from the available inventory data for the Three Rivers site:

1. The first is that with the exception of the initial survey conducted by Vriend and Clark (1975) and the 1982 river survey, which included the lower end of the reservoir site, winter population data for the Three Rivers site are lacking. Vriend and Clark (1975) report a small winter population of mule deer on the site. Subsequent surveys of surrounding areas show mid-winter mule deer densities that are very high and indicate that the region generally is important as a mule deer wintering area. The 1982 river survey (Gudmundson 1982) indicates that the Oldman River valley in the vicinity of the damsite also supports high densities of mule deer and that downstream areas are important for mule deer and white-tailed deer. Without census data for the rest of the proposed reservoir area it would only be speculative at this time to suggest that it also is an important winter habitat area for deer.

2. No complete census data are available for the Three Rivers site during spring, summer and fall. The only available information was obtained from interviews with local residents and the 'incomplete ground reconnaissance' conducted by Horejsi et al. (1978) in the spring of 1978. This information suggests that mule deer occur year round on the Three Rivers site, with a spring and summer population that numbers upwards of 70 mule deer.

3. The absence of seasonal population data for most of the Three Rivers site makes it impossible to evaluate the importance of the site during the various seasons of the year. Although the data obtained for the downstream end of the reservoir site in 1982 indicate that the Oldman River valley supports moderately high winter deer densities, the absence of comparative information for the snow-free periods of the year makes it impossible to determine whether these high densities result from an ingress of animals during winter or whether they represent a population that is resident year round. In the prairies, deer typically move into river valleys in winter to obtain shelter and to take advantage of forage available in snow-free areas along southern exposures. In the foothills region, mule deer often select windswept ridges and southwest-facing slopes in upland areas as winter habitat. Both types of habitat are available within the range of mule deer at the Three Rivers site.

4. Mule deer is the most abundant ungulate species in the vicinity of the Three Rivers site. The status of other ungulate species within the proposed reservoir area is unknown however. Vriend and Clark (1975) did not observe any other species during their 1975 winter survey but provide an estimate of 30 white-tailed deer for the Three Rivers site, based on landowner interviews. White-tailed deer were not observed in survey area OM-25 in January 1982 (Table 1). The absence of large expanses of woody cover within the reservoir site indicates a low capability for moose and elk, however both species were common in survey block FH 1 at the upstream end of the reservoir on the Crowsnest River (Table 1). The Three Rivers site is clearly situated in an abrupt transition zone between grassland (prairie) and montane (foothills) ecoregions. This transition is reflected in the species composition and abundance of faunal associations in the area. The unique position of the Three Rivers site makes it more difficult to draw conclusions about the possible importance of the site to different species of ungulates on

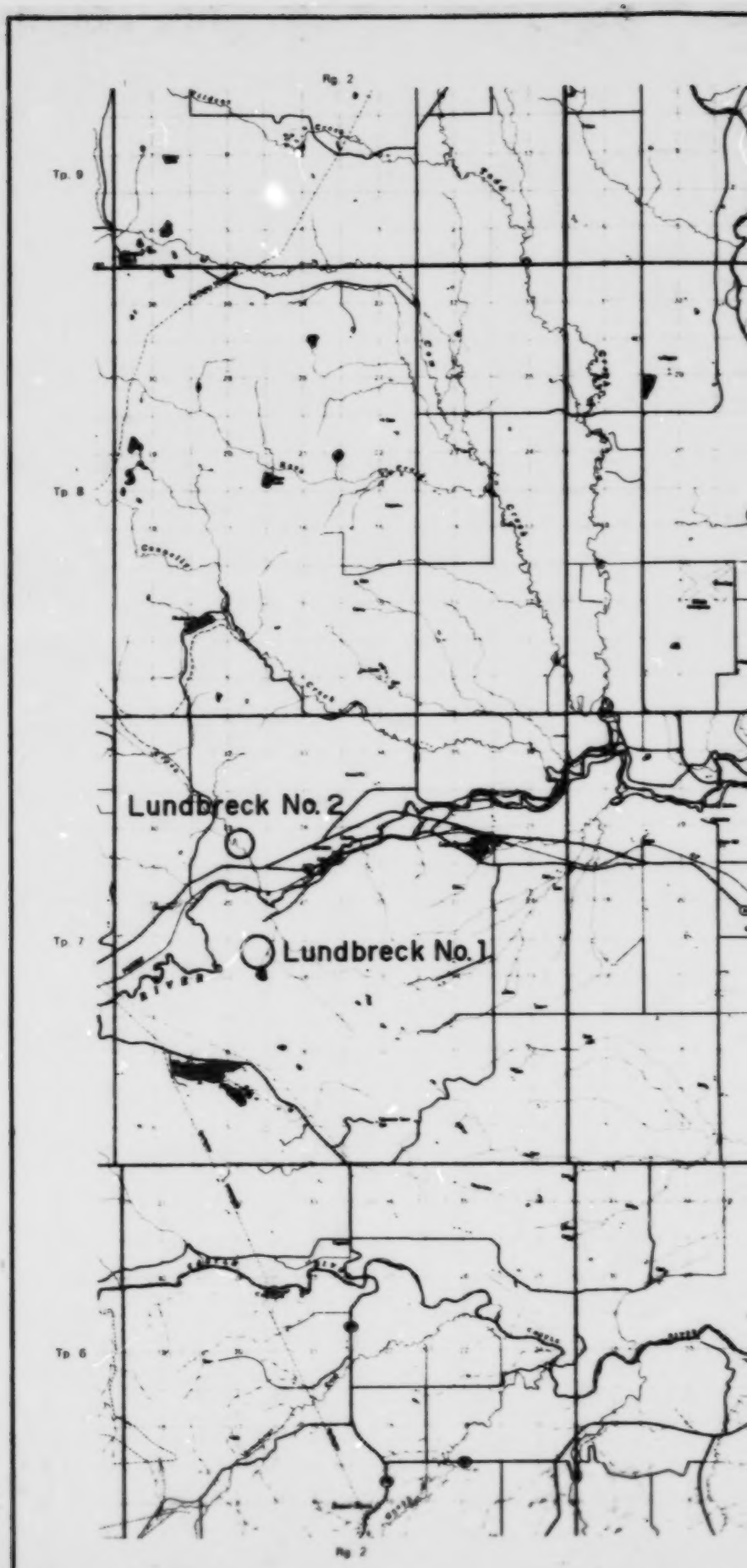
the basis of survey information available for areas located upstream and downstream of the reservoir site itself.

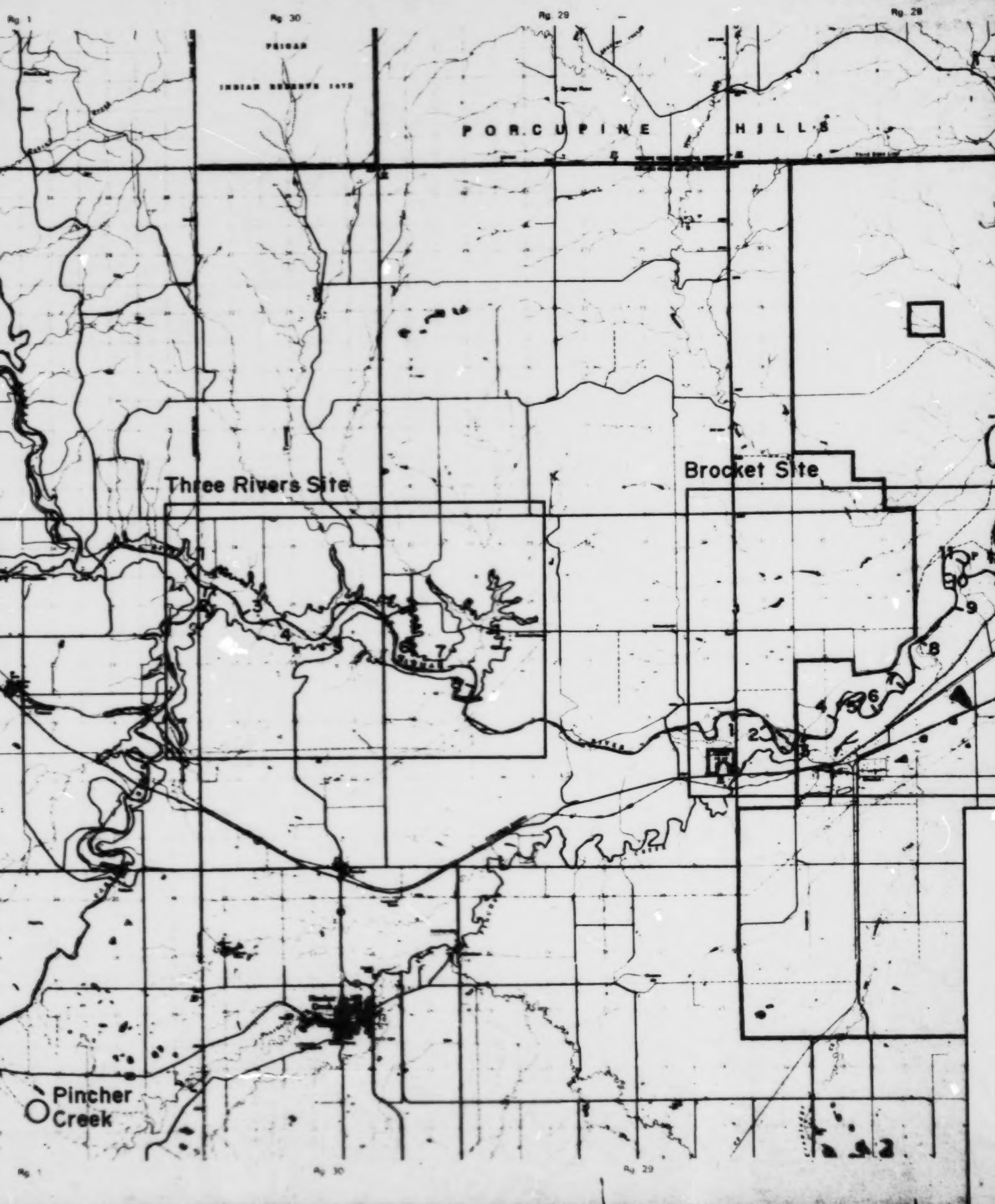
4.2.1.3 Habitat Use and Range Condition

Little information is available on seasonal habitat use by ungulates within the Three Rivers site. Vriend and Clark (1975) reported that during winter, mule deer use southwest-facing slopes along the river valleys, with some areas receiving more use than others, depending on the availability of adjacent cover. They feed on a combination of woody browse and herbaceous forage. During spring they depend on wooded areas within the valley for shelter and use grassed benches, draws and adjacent uplands for forage (Horejsi et al. 1978). Wooded areas within the valley are probably important as fawning sites. Thomas (1979) reports that the characteristics of optimum fawning sites for deer are small (0.4 to 2.0 ha) wooded areas with a 50% canopy cover and a dense low shrub layer, located within approximately 180 m of potable water. In the prairie region of southern Alberta, riparian habitats along water courses are often the only areas that satisfy these requirements.

White-tailed deer are thought to have a greater requirement for woody cover than mule deer (Vriend and Clark 1975). Extensive seasonal movements usually do not occur, consequently white-tailed deer likely reside in the river valley year round (Vriend and Clark 1975). Unlike mule deer, white-tailed deer reach their highest densities in agricultural areas where cultivated crops provide a source of food. Legume forage crops provide preferred summer forage, while browse becomes important in fall and winter (Allen 1968, Martinka 1968). In Alberta, use of unharvested alfalfa continues to occur during mild winters (Young 1973). An increase in the proportion of cultivated land is likely responsible for the increased abundance of white-tailed deer observed east of Pincher Creek (Vriend and Clark 1975).

In 1978, the Fish and Wildlife Division initiated a browse survey program to monitor browse use on deer winter ranges in southern Alberta. The browse surveys were then carried out annually until 1981 (Clark and Vriend 1981). Three of the 20 survey areas in the foothills region are located in the vicinity of the Three Rivers site (Figure 4). These sampling areas correspond to several of the known winter ranges surveyed during the foothills deer surveys (i.e. FH1, FH2, FH4). Browse surveys


Rg. 2
Tp. 9
Tp. 8
Tp. 7
Tp. 6
Lundbreck No. 2
Lundbreck No. 1
Rg. 2


Rg. 1
Rg. 30
PEIGAN
INDIAN RESERVE 147B
Rg. 29
Rg. 28
PORCUPINE HILLS
Three Rivers Site
Brocket Site
Pincher Creek
Rg. 1
Rg. 30
Rg. 29

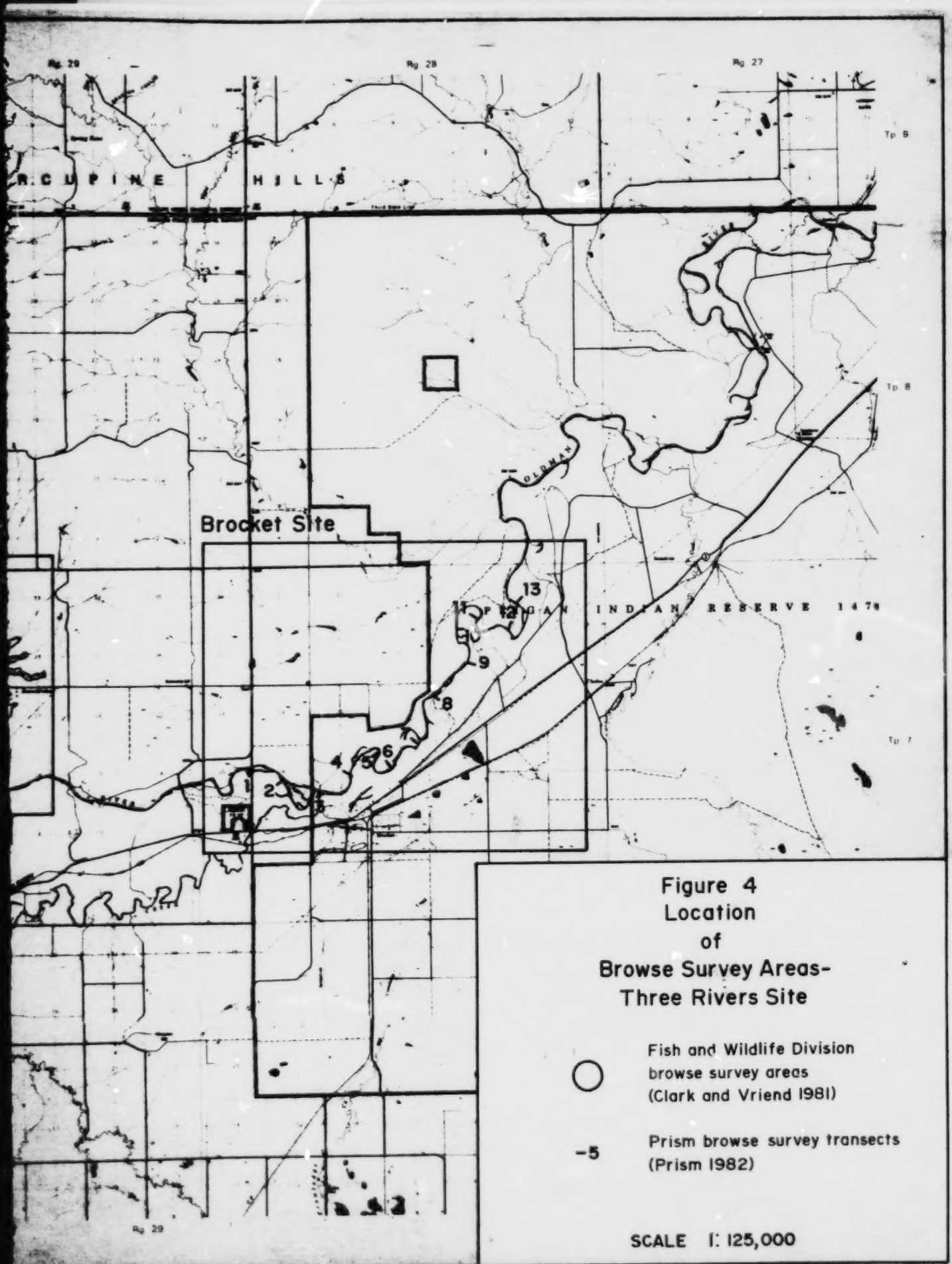


Figure 4
Location
of
Browse Survey Areas-
Three Rivers Site

○ Fish and Wildlife Division browse survey areas (Clark and Vriend 1981)

-5 Prism browse survey transects (Prism 1982)

SCALE 1: 125,000

were also conducted by a consulting company as part of an evaluation of the wildlife resources of the proposed Brocket damsite (Prism 1982). These surveys included eight transects placed along the Oldman River within the Three Rivers site (Figure 4).

Both surveys employed different sampling methods. The Fish and Wildlife Division used a quantitative method, which involved counting the number of browsed and unbrowsed leaders on 15 sample stems of each browse species within the browsing range of deer (0.3 to 2.0 m). Species that showed a low preference by ungulates were not included during the later surveys (Clark and Vriend 1981). The Prism (1982) surveys were confined to areas immediately adjacent to the river. Fifty metre long transects were established perpendicular to the river at each sample site. The degree of browsing and condition of shrubs contacting the transect were visually estimated (Prism 1982). Because of the different survey methods, the results are not strictly comparable.

Table 2 shows results of the browse surveys conducted by the Fish and Wildlife Division in 1981 and compares average browse utilization levels recorded on the foothills survey areas from 1978 to 1981. The results show that utilization levels of principal browse species on the Lundbreck and Pincher Creek sampling areas during the winter of 1980-81 were quite high. Aspen, willow, and saskatoon all had utilization levels exceeding 60% of available browse. Utilization levels that exceed 60% are often considered indicative of browse overutilization since repeated browsing at these levels can reduce the health of the plants (Smith et al. 1972, Telfer and Scotter 1975). Clark and Vriend (1981) report that the browse utilization levels recorded in 1981 were lower than those observed in some previous years. They attributed this to below normal snowfall during the winter of 1980-81, which resulted in greater availability of browse and a more widespread distribution of deer.

Browse utilization levels recorded by Prism (1982) in the Three Rivers site for the winter of 1981-82 were substantially lower than those reported for the Fish and Wildlife Division survey areas (Table 3). Only 34% of the plants received any use by ungulates and just 2% of the plants were in the 61% to 100% utilization category. Species receiving the highest use were saskatoon, rose, willow and wolf willow. Browse utilization levels recorded at the Three Rivers site were somewhat lower than those detected in downstream sampling locations. The majority of browse

Table 2. Percentage of leaders browsed for the various plant species measured on the foothills browse survey areas, 1981. (From Clark and Vriend 1981).

SURVEY AREA	SPECIES							
	WILLOW	DOGWOOD	CHOKE-CHERRY	SASKATOON	WOLF WILLOW	ASPEN	SNOW-BERRY	
Lundbreck #1 (S)	77	43	55	67	20	68	14	
Lundbreck #2 (N)	39		59	70	27	60	18	
Pincher Creek	49		52	55	24	52	11	
Dutch Creek	17					3		
N.W. Branch	78					10		
Racehorse Creek	60		70	42	36	12	4	
Bobs Creek #1	58	54	33	43	7	39	2	
Bobs Creek #2	65	42				9		
Lyndon Creek	36		48	15	0	5	55	
Cripple Creek	39		72	64		21	42	
Trout Creek	52		76	57	21	23	17	
Streeter Basin	83		70	66		36	34	
Five Mile Creek	60		62	71	35	5	18	
Burke Creek			40	54		43	35	
North Creek	28			38		10	0	
Sharples Creek	10		58	23		11	36	
Heath Creek	38			50		29	32	
Beaver Creek			59	30		5	9	
Ward Creek	57		95	76		26	17	
Mill Coulee	62		36	39	2	14	23	Overall Average
1981 Average	50.4	46.3	59.0	50.6	19.1	39.1	21.6	40.9
1980 Average	45.0	61.7	68.3	51.1	16.6	25.6	22.7	41.6
1979 Average	56.4	53.7	54.6	46.8	36.7	35.0	30.1	44.9
1978 Average	63.6	50.6	76.7	74.5	59.0	37.6	23.1	55.1

Table 3. Utilization of shrub species for each area. (From Prism 1982).

Species	Brocket Damsite					Damsite to L.N.I.D. Weir					Three Rivers					Fort MacLeod				
		Use Category[1]					Use Category					Use Category					Use Category			
	n	1	2	3	4	n	1	2	3	4	n	1	2	3	4	n	1	2	3	4
		2)																		
Willow	76	66	19	10	5	66	64	32	4	0	26	45	49	6	0	43	35	28	16	21
Poplar	35	51	41	8	0	67	74	26	0	0	37	70	10	20	0	21	62	24	3	11
Snowberry	72	70	19	11	0	108	72	18	0	10	105	82	17	1	0	109	91	9	0	0
Dogwood	88	31	21	11	37	61	8	15	24	53	1	0	0	0	100	49	5	11	2	82
Buffalo-berry	5	83	17	0	0	3	25	75	0	0	0	0	0	0	0	7	11	39	33	17
Wolf Willow	21	66	27	7	0	67	56	39	5	0	119	62	37	1	0	47	34	52	6	8
Rose	81	27	54	12	7	140	21	38	5	0	37	29	26	34	11	83	40	49	6	5
Choke Cherry	15	72	3	25	0	12	37	17	3	43	21	72	5	11	12	35	75	18	7	0
Saskatoon	17	67	25	8	0	28	42	36	9	13	14	10	40	50	0	36	47	23	17	13
Alder	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	100	0	0	0
Currant	2	100	0	0	0	2	100	0	0	0	0	0	0	0	0	4	50	50	0	0
TOTAL	412	61	24	9	6	554	60	28	5	7	360	66	27	5	2	437	49	27	6	16

1)
n = number of shrubs sampled
1 = 0% of leaders browsed
2 = 1 to 30% of leaders browsed
3 = 31 to 60% of leaders browsed
4 = 61 to 100% of leaders browsed

2)
figures in percent (%)

plants at the Three Rivers site were judged to be in good to excellent condition, based on a generalized rating system that considered the amount of new growth, degree of hedging and percentage of dead growth (Table 4).

4.2.2 Furbearers

Information is lacking on the status of furbearing mammal populations in the Three Rivers site. No registered trapping areas occur either within the proposed reservoir area or within the general vicinity of the Three Rivers site. This reflects the patented land status of most of the area. A limited amount of trapping is conducted on privately-owned land in the area (J. Allen, Alberta Fish and Wildlife Division, Pincher Creek, pers. comm.). The principal species harvested are beaver, coyote, fox and mink. Records of fur harvests are not readily available since landowners do not require a license to take coyotes or foxes and other individuals licensed to trap on private land are not required to submit fur affidavits as is the case with registered trapping areas.

Todd (1976) conducted a preliminary evaluation of habitat capability for furbearers along the Oldman River and its tributaries. Aerial reconnaissance and photo interpretation were used to develop capability ratings that reflected the present (i.e. 1976) value of the land for furbearer production. Furbearers were divided into five ecological groups:

1. Plains dwelling species (including coyote, red fox, skunk, badger, long-tailed weasel and jack rabbit).

2. Woodland species (bobcat and raccoon) - those species typically inhabiting deciduous woodlands in the Transition and Upper Sonoran Life Zones.

3. Forest species - a generalized group, including the remaining upland furbearers and covering all forest successional stages (includes red squirrel, marten and mink).

4. Beaver

5. Muskrat

Cabability for production of each group of furbearers was rated as: (1) Excellent, (2) Good, (3) Moderate or (4) Poor. The river bottomlands were divided into river

Table 4. Condition class for the shrub species of each study area. (From Prism, 1982).

Species	Brocket Damsite				Damsite to L.N.I.D. Weir				Three Rivers				Fort MacLeod			
		Condition [1]				Condition				Condition				Condition		
	n	E/G	F/P	Dead	n	E/G	F/P	Dead	n	E/G	F/P	Dead	n	E/G	F/P	Dead
		[2]														
Willow	76	75	13	12	66	77	9	14	26	78	22	0	43	49	24	27
Poplar	35	74	22	4	67	81	14	5	37	61	33	6	21	46	23	31
Snowberry	72	75	25	0	108	90	10	0	105	92	7	1	109	94	3	3
Dogwood	88	60	34	6	61	86	13	1	1	0	100	0	49	64	31	5
Buffalo-berry	5	83	17	0	3	100	0	0	0	0	0	0	7	78	22	6
Wolf Willow	21	43	51	6	67	79	21	0	119	74	24	2	47	79	18	3
Rose	81	77	22	1	140	94	4	2	37	65	32	3	83	80	15	5
Choke Cherry	15	100	0	0	12	97	3	0	21	98	2	0	35	100	0	
Saskatoon	17	92	8	0	28	93	6	1	14	75	25	0	36	80	13	
Alder	0	0	0	0	0	0	0	0	0	0	0	0	3	50	50	
Currant	2	100	0	0	2	100	0	0	0	0	0	0	4	0	100	
TOTAL	412	74	22	4	554	85	10	5	360	81	17	2	437	72	22	

1)
n = number of shrubs sampled
E/G = Excellent/Good condition
F/P = Fair/Poor condition

2)
figures in percent (%)

system segments. Unit XIII encompassed the Three Rivers site including the Oldman River upstream from the Peigan Indian Reserve, and the lower portions of the Castle and Crowsnest Rivers.

The overall capability of this unit was rated as moderate. Todd (1976) noted that, although this unit was transitional between plains and foothills, the predominance of grassland communities results in a poor capability for forest-dwelling species. The capability is good for plains dwellers and moderate for woodland species. Because of the swift velocity and rocky or gravelly substrate of rivers in this area, capability for beaver and muskrat is poor. Prism (1982) noted that most of the beaver activity in the area was restricted to backwater areas and isolated channel segments.

4.2.3 Small Mammals

This category includes species of mammals that were not considered in previous sections. Eight species of bats may occur in the vicinity of the proposed Three Rivers reservoir (Appendix I) but only four species regularly occur in southern Alberta (Schowalter 1979). These include the little brown bat, big brown bat, long-eared bat and the long-legged bat. The remaining species either rarely occur or are only observed as migrants over the study area.

Other mammal species which may also commonly occur include: the white-tailed jack rabbit, Nuttall's cottontail, Richardson's ground squirrel and several species of mice and voles (Appendix I). These species are important since they represent major prey items for a number of carnivores and raptors that inhabit the Three Rivers area. However, the extent of their distribution, relative abundance and habitat preferences have not been specifically documented for the proposed reservoir site.

The long-tailed weasel is a threatened wildlife species in Canada (COSEWIC 1982). It is considered an ecotonal species (Gamble 1981) that relies on a diversity of prey items that occur in open grasslands, aspen parkland and river bottoms (Soper 1964, Banfield 1974). Because of its large size, this weasel will prey upon larger animals and birds but it tends to prefer small mammals. Long-tailed weasels are considered an opportunistic species (Gamble 1981). Thus, when a particular prey species becomes scarce, the long-tailed weasel will readily change its feeding behavior to other more available prey species. Long-tailed weasels also require a

source of water proximal to denning sites. Apparently, if water is not readily available, the long-tailed weasel will not occur in the area (Gamble 1981). However, Soper (1964) reported that the weasel will often utilize dens previously inhabited by ground squirrels, pocket gophers and badgers even though they are not located near water. Home range sizes vary from 4 ha (Banfield 1974) to 100 ha, but in optimal habitats, long-tailed weasels will remain relatively sedentary (Gamble 1981).

Historically, the long-tailed weasel was abundant throughout the prairie provinces, however populations have declined steadily over the last 45 years (Gamble 1981). Major reasons for this decline include loss of habitat due to increased agricultural activity, increased use of agricultural pesticides and loss of denning sites through flooding for dams or waterbody drainage practices (Gamble 1981).

The American badger also occurs on the COSEWIC (1982) list. Although this species is not considered rare, threatened, or endangered, concern over the effects of continued intensive agricultural practices and other human disturbances have resulted in the inclusion of the badger on the list. The American Badger is biologically one of the least known members of the Mustelid family in North America (Banfield 1974, Stardom 1978), and no information exists on the status of this species in the Three River area. The badger is considered an opportunistic carnivore, feeding mainly on ground squirrels, pocket gophers, pocket mice, mice and voles. Badgers reach their highest densities on open prairies, farmlands and parklands (Banfield 1974, Stardom 1978), however they also utilize forest edges (Stardom 1978).

In the past, badgers commonly occurred throughout the prairies, however, recent population declines have raised some concerns as to its population status. In Canada, its general status is considered not satisfactory but badgers are common in core habitat areas. Habitat losses through intensive agricultural practices and general human disturbance are considered as the major limiting factors (Stardom 1978). Moreover, increasing use of rodenticides and increasing fur values are placing additional demands on the badger population.

4.3 BIRDS

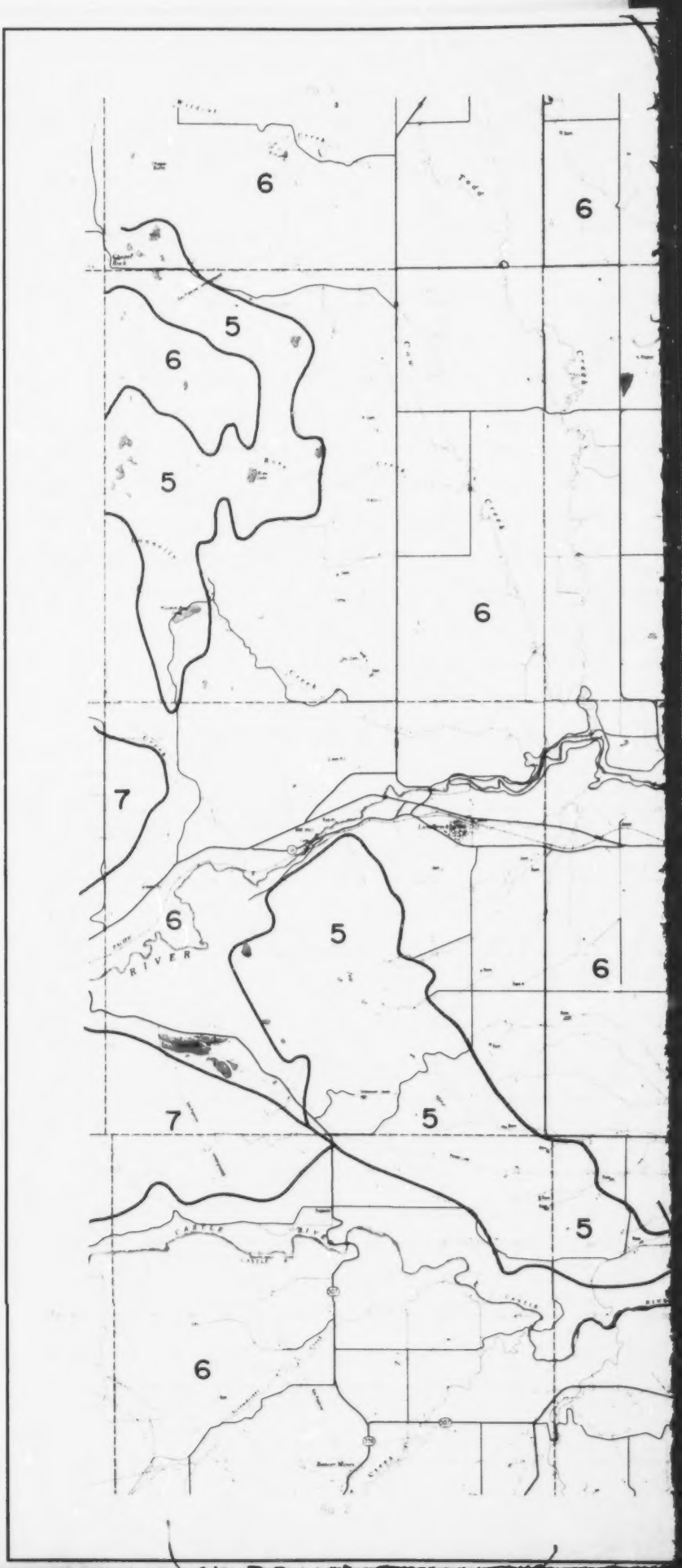
Based on the references examined (Godfrey 1966, Sadler and Myers 1976, Salt and Salt 1976, McNicholl et al. 1981), 241 bird species are expected to occur in the

vicinity of the Three Rivers dam site at various times of the year (Appendix II). This list includes only breeders, residents, migrants and summer and winter visitors. Because of the unpredictable occurrences of some species, accidental observations were not included in the species list. Of the 241 species, eight are considered as common or fairly common year round residents, while an additional 42 species are listed as common or fairly common breeders. The remaining species are likely to occur as spring and fall migrants in the study area (Appendix II).

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC 1982) lists nine avian species which may occur in the study area with a designated status as of April 1982. These species include the red-necked grebe (not in any category (N.I.A.C)), white pelican (threatened), double-crested cormorant (N.I.A.C.), ferruginous hawk (threatened), gyrfalcon (N.I.A.C), prairie falcon (N.I.A.C.), peregrine falcon (threatened), sandhill crane (N.I.A.C), and the burrowing owl (threatened). The N.I.A.C. rating indicates that, although the species is not rare, threatened or endangered, concerns over its future status exist. Of these, only the ferruginous hawk and prairie falcon occur as breeders in the study area, while the sandhill crane is a common migrant (Appendix II). No double-crested cormorant or white pelican colonies are known to occur in the vicinity of the proposed Three Rivers reservoir site (Brechtel 1981). The remaining species likely occur only as rare migrants over the study area (Appendix II).

4.3.1 Waterfowl

According to the Canada Land Inventory ratings, land capability for waterfowl production at the Three Rivers site is very low (C.L.I. 1970, 1973b). Lands in this rating class are extremely flat, which precludes the development of and reduces the permanency of wetlands (Figure 5). The river valleys are also rated very low but, in addition to topographic restrictions, these areas are also limited by fast flowing water which restricts shoreline vegetation development. An area with a moderately high capability for waterfowl production is located just north of Secondary Road 507 (Figure 5). Production capabilities on lands in this area are influenced by periodic droughts, which dry up temporary and semi-permanent waterbodies. No key areas for waterfowl production have been identified by the Alberta Fish and Wildlife Division in the immediate vicinity of the Three Rivers site (Figure 5).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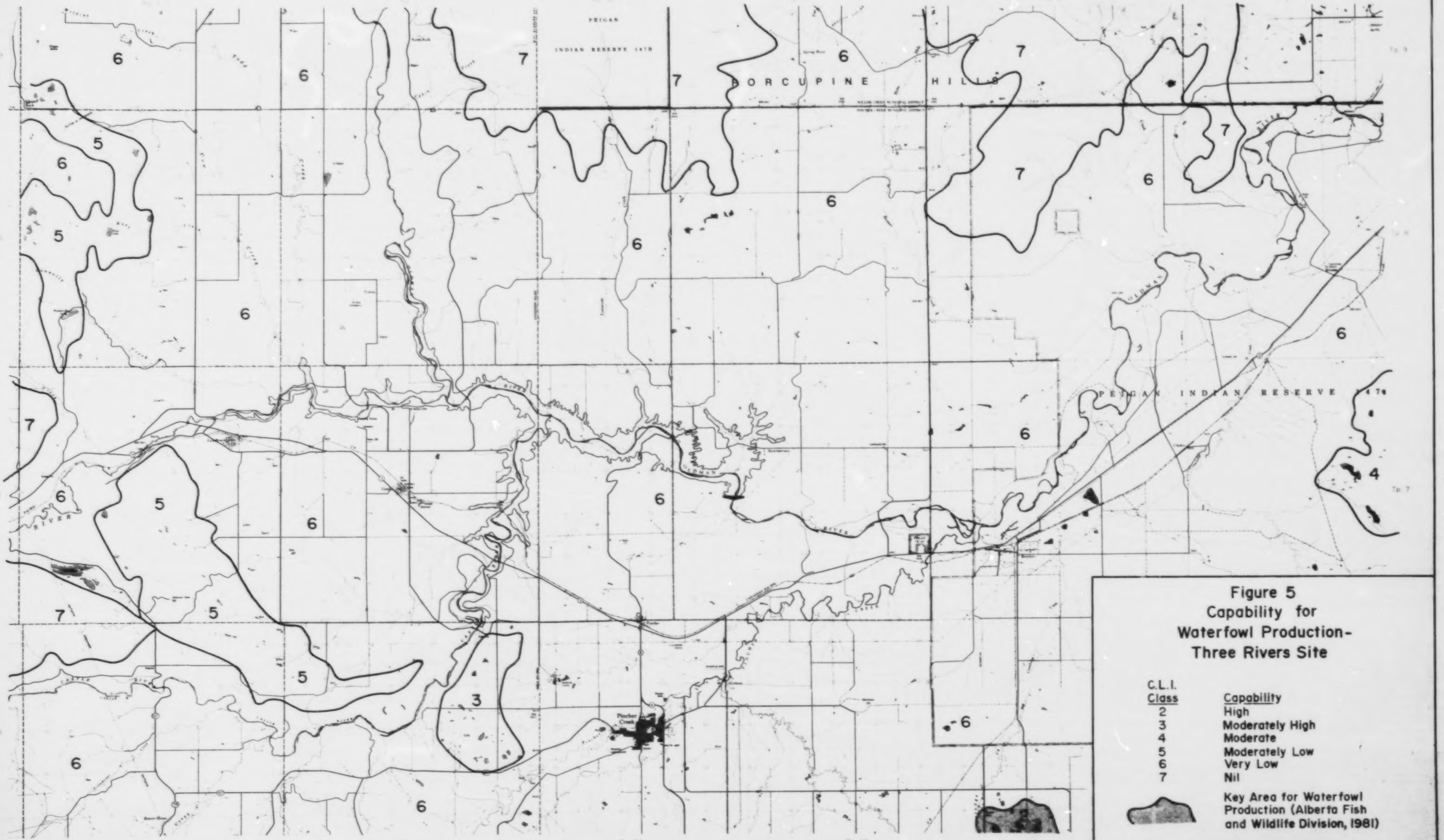


Figure 5
Capability for Waterfowl Production-
Three Rivers Site

C.L.I. Class	Capability
2	High
3	Moderately High
4	Moderate
5	Moderately Low
6	Very Low
7	Nil

Key Area for Waterfowl Production (Alberta Fish and Wildlife Division, 1981)

SCALE 1" 125,000

Although the Three Rivers site has a very low capability for waterfowl, previous studies have documented the occurrence of nesting Canada geese in the area (Horejsi et al. 1978, Prism 1982). These geese apparently prefer nesting on forested islands within the rivers, however some river bank nesting was also observed (Horejsi et al. 1978). Surveys conducted downstream of Lethbridge show a moderately high production of Canada geese along the Oldman River (Froggatt 1979, Froggatt 1981).

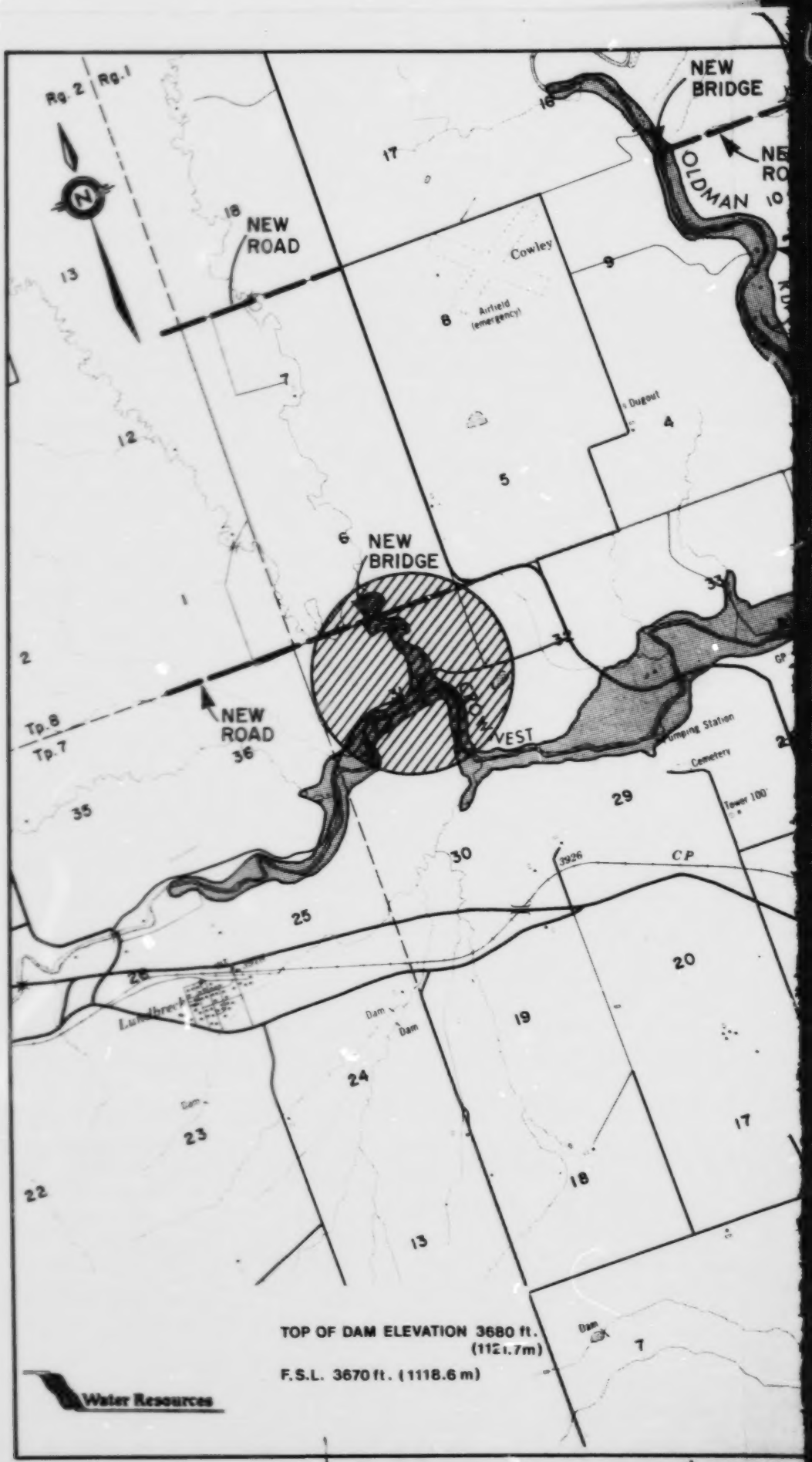
Other waterfowl species are also likely to occur at the Three Rivers site but species composition and relative abundance are not known. Since the Three Rivers site is not located near any of the major flyways, it has a limited potential for use by spring and fall migrating waterfowl (Vriend and Clark 1975, H. Weaver, Alberta Fish and Wildlife Division, pers. comm., Feb. 20, 1985).

4.3.2 Raptors

The relative abundance, distribution and preferred habitats of many of the raptor species which may occur in the Three Rivers area has been quite well documented. The Alberta Fish and Wildlife Division and the Canadian Wildlife Service have surveyed this portion of the Oldman River system yearly and have data concerning distribution and relative abundance of most raptor species.

During a reconnaissance flight over the proposed dam site in 1976, Horejsi et al. (1978) did not observe any raptors. However, through personal interviews with landowners and Alberta Fish and Wildlife personnel, sightings of several species were recorded. These included a pair of non-nesting merlins and a nesting ferruginous hawk just east of the northern edge of the proposed damsite (Horejsi et al. 1978). Both species are considered threatened by Salt and Salt (1976) and COSEWIC (1982). Other species of raptors that likely occur in the vicinity of the proposed Three Rivers reservoir include the rough-legged hawk, American kestrel, Swainson's hawk and marsh hawk.

Although the peregrine falcon was once abundant in Alberta (Salt and Salt 1976), it now only nests in the northern part of the province. However, peregrine falcons historically nested in an area located near the western end of the reservoir site along the Crowsnest River (Figure 6). This area is considered significant since it is known to offer potential nesting sites should the peregrine begin nesting in the area again (D. Moore, Alberta Fish and Wildlife Division, pers. comm., Feb. 20. 1985).


NEW BRIDGE
NEW ROAD
NEW BRIDGE
NEW ROAD
OLDMAN
Cowley
Airfield (emergency)
Dugout
Tp.8
Tp.7
Pumping Station
Cemetery
Tower 100'
CP
Dam
Dam
Dam
Rg.2
Rg.1
TOP OF DAM ELEVATION 3680 ft. (1121.7m)
F.S.L. 3670 ft. (1118.6 m)
Water Resources

NEW BRIDGE

NEW ROAD

OLDMAN RIVER

TOP OF DAM 3680 ft.

Rg.1 | Rg.30 | FIFTH MERIDIAN | Rg.30 | Rg.29

Summerview

TOP OF DAM 3680ft.

OLDMAN

DAM

RIVER

NEW BRIDGE

NEW ROAD

UPGRADED CAUSEWAY AND BRIDGE

NEW ROAD

UPGRADED RAIL CROSSING

UPGRADED ROAD CROSSING

CANADIAN PACIFIC

TOP OF DAM ELEVATION 3680 ft. (1121.7m)

F.S.L. 3670 ft. (1118.6 m)

Figure 6
Locations of Prairie Falcon Nest Sites- Three Rivers Reservoir Area

Prairie Falcon Eyrie

Historical Peregrine Falcon Nesting Area

SCALE 1: 125,000

The presence of a ledge with an overhang on cliffs overlooking water provides ideal nesting habitat for this species.

Because of its COSEWIC status, the prairie falcon has also received widespread interest from concerned groups, however, unlike the peregrine falcon, the prairie falcon is still actively nesting in the vicinity of the proposed Three Rivers reservoir. Seven prairie falcon eyries have been identified as being actively used in the vicinity of the Three Rivers site (D. Moore, Alberta Fish and Wildlife Division, pers. comm., Feb. 20, 1985). Three of these are located along sections of river valley that would be flooded by the project and one is situated near the proposed damsite. The remaining three eyries are further than 1 km from the proposed reservoir site.

Nest site requirements of the prairie falcon are generally similar to those of the peregrine falcon. Nests are typically located in holes or crevices on cliffs. Ledges with an overhang, holes, or larger caves are preferred, however old cliff nests of other raptors may also be used (Call 1978, Woodsworth and Freemark 1981). Nesting pairs usually have alternate nesting sites on the same cliff or on adjacent cliffs (Call 1978). One factor responsible for the breeding success of prairie falcons in the Three Rivers area is the presence of sandstone bedrock exposures along the river valleys, which provide secure, relatively permanent nesting sites. Unlike the peregrine falcon which generally feeds on birds, the prairie falcon primarily feeds on small mammals, although insects and small to medium sized birds are also taken (Salt and Salt 1976).

Ferruginous hawks and burrowing owls are also threatened raptor species that may occur in the Three Rivers study area (Appendix II). Ferruginous hawks occupy open grassland and sage habitats in western Canada. They commonly nest on hills or cutbanks, trees or on man-made structures (Schmutz and Schmutz 1980, Schmutz 1984). Ground squirrels and jack rabbits are the major prey species of ferruginous hawks, especially during the nesting period. Although ferruginous hawks are extremely adaptable in their nesting sites, they do not readily adapt to human disturbance (Schmutz and Schmutz 1980). This appears to be particularly important during the nesting period since Schmutz and Schmutz (1980) observed no nests closer than 400 m from an occupied farm. Moreover, hawks showed only mild, if any, nest defense toward human intruders. Recently, Schmutz (1984) reported that ferruginous hawks avoid areas where more than 50% of the land has been

cultivated. This appears to be related to changes in prey species composition, the ability of hawks to capture prey in tall crops and difficulties in taking off in dense crop lands. Thus, in addition to habitat and prey losses through increased agricultural activity, low tolerance levels to human disturbance appear to be major factors limiting their distribution in western Canada.

The burrowing owl may occur in the Three Rivers study area as an occasional breeder (Appendix II), however most of the locality records for this species are located east of Fort McLeod (Wedgewood 1978). Unlike the ferruginous hawk, the burrowing owl is considered unique by COSEWIC because it is often closely associated with rural farms and villages (COSEWIC 1982). Openness, short vegetation and burrow availability are considered essential features of burrowing owl habitat (Zarn 1974, cited in Wedgewood 1978). Salt and Salt (1976) defined the burrowing owl's habitat as short-grass plains with Richardson's ground squirrels. Although no specific studies on this owl's food habits have been conducted, it is generally agreed that insects (particularly arthropods) and small mammals form a significant portion of their diet (Banfield 1974, Wedgewood 1978). In summarizing their status report, Wedgewood (1978) felt that the loss of open short-grass prairies through over-grazing and increased cultivating, loss of nest burrows and chemical contamination are among the major factors affecting current population levels of burrowing owls.

4.3.3 Upland Game Birds

Ring-necked pheasants, ruffed grouse, Hungarian partridge and sharp-tailed grouse are known to occur within and around the Three Rivers reservoir area (Vriend and Clark 1975, Horejsi et al. 1978, Prism 1982). However, the presence of ruffed grouse likely reflects the southern limit of their range in Alberta (Salt and Salt 1976) and as a result they are not expected to occur in high numbers. Hungarian partridge and sharp-tailed grouse are apparently the most abundant upland game bird species in the area (Vriend and Clark 1975). The Fish and Wildlife Division has not released pheasants in the vicinity of the Three Rivers site, however a cooperative raiser located several miles south of the reservoir (SW19-T6-R1-W5) has been releasing around 50 birds per year in the area (L. Lester, Brooks Wildlife Center, pers. comm., Mar. 5, 1985).

Although the Hungarian partridge is a species of shrubby plains, it has adapted to a

wide variety of habitats (Salt and Salt 1976), often selecting areas adjacent to farm yards and cultivated fields during the winter period (Vriend and Clark 1975). Sharp-tailed grouse typically prefer brushy areas but are often observed feeding in grain fields (Salt and Salt 1976). In a study of sharp-tailed grouse in the southern region of Alberta, Clark (1981) reported that these grouse prefer three general habitat types: sand hills, gently rolling native grass prairie interspersed with shrubby patches, and the foothills. In early spring, sharp-tailed grouse congregate on traditional dancing grounds, where the males perform courtship displays for the females. Clark (1981) compiled information on known sharp-tailed grouse dancing grounds in southern Alberta, however none were reported in the vicinity of the Three Rivers reservoir. Horejsi et al. (1978) reported that a dancing ground used by about 20 birds was located near the "proposed site boundary", however the exact location and current status of the dancing ground is not known.

4.3.4 Other Birds

The status, distribution, relative abundance and habitat preferences of the remaining avifauna listed in Appendix II are not known. Prism (1982) conducted a canoe survey of the Three Rivers area, however this yielded only a brief species list. Bird species recorded during this survey included a great blue heron, kingfisher, killdeer, kingbird, spotted sandpipers, robins, starlings, ravens, crows and wrens. In addition, Horejsi et al. (1978) observed large numbers of cliff swallows nesting beneath overhanging cliffs along rivers and creeks in the area.

4.4 HERPETOFAUNA

The species composition, abundance and distribution of herpetofauna in the vicinity of the Three Rivers reservoir is poorly known. Very few locality designations exist for the area and those that do generally represent scattered incomplete reports. However, based on a review of published reports and personal interviews six amphibian and four reptilian species likely occur in the area (Appendix III). Of these, the wood frog, tiger salamander, western painted turtle and red-sided garter snake are species for which no locality records have been reported, however, they are considered likely residents (W.E. Roberts, Curator, Museum of Zoology, University of Alberta, pers. comm., February 26 1985).

Although no Alberta amphibians and reptiles are on the COSEWIC status list, a tentative "blue list" of endangered and threatened species specific to Alberta

indicates two such species occur in the Three Rivers area (Roberts 1982a). The northern leopard frog is considered threatened, while the western painted turtle has reached the endangered level.

Locality records for the western painted turtle show that natural populations are primarily distributed in the southeastern portion of Alberta (Lewin 1963). However, successful introductions of this species have occurred in the Crowsnest Pass and other areas in southern Alberta. Since turtles are quite mobile, downstream movements along the Oldman River to the Three Rivers reservoir site can be expected (W.E. Roberts, Curator, Museum of Zoology, University of Alberta, pers. comm., February 26 1985).

5.0 PROJECT IMPACT AND MITIGATION

5.1 INTRODUCTION

The intent of this report is to review and summarize impact assessments and mitigation strategies that have been previously identified for reservoir development at the Three Rivers site. Consistent with the requirements of a Phase I Overview, this review is restricted to currently available reports and information.

Several previous studies have addressed the effects of reservoir development at the Three Rivers site on wildlife. These studies were part of the iterative water management planning process conducted by the Government of Alberta between 1974 and 1978. The initial (Phase I) planning studies of the Oldman River Basin began in 1974 under the direction of the Planning Division of Alberta Environment. Reports by Vriend and Clark (1975) and Keith-Angus Butler (1975) describe implications of water management on the Oldman River to wildlife. Following government and public review of the Phase I studies, Phase II studies were undertaken in 1977 to provide a more comprehensive evaluation of selected water management alternatives. The initial Phase II report was prepared by LGL and The Sibbald Group, addressing the environmental implications of 15 water management alternatives. This formed a basis for reducing the number of management alternatives to seven, of which three involved on-stream water storage. An environmental evaluation of the remaining seven alternatives was conducted in 1978 by The Lombard North Group and the Sibbald Group (Horejsi et al. 1978).

These are the only reports that specifically address environmental impact and mitigation for the Three Rivers site. Some additional information and concerns surfaced during public hearings conducted by the Environment Council of Alberta during 1978 (ECA 1979). As well, some information pertinent to the Three Rivers site is contained in a report prepared by Prism (1982), which contains the results of wildlife investigations conducted on behalf of the Peigan Indian Band, to determine the effects of reservoir development at the Brocket site on the wildlife resources of the Reserve.

In reviewing the impact assessments made during the course of these earlier studies, two important points should be mentioned. The first is that these studies involved an overview level evaluation of a number of alternative projects. As a

consequence the impact assessments are not very detailed. The second, and more important point, is that almost no baseline data on the status of wildlife populations at the Three Rivers site were available at the time these reports were prepared. For example, almost all of the data on ungulate and raptor populations that currently exist for the area were collected from 1978 to 1982. The status of other groups of wildlife in the area is still largely unknown. The lack of baseline data led to generalized descriptions of impacts with little or no quantification of the magnitude of impact on wildlife populations. This limitation was in fact pointed out by the authors of each of these reports.

5.2 HABITAT

Impact

All of the previous reports identified habitat loss within the 2350 ha reservoir area as a major impact. Reservoir flooding will result in loss of cover, forage, hunting territories, and nesting or denning habitat below full supply level (FSL). Further loss of habitat above FSL has been predicted as a result of shoreline slumping caused by wave action and wind erosion of newly exposed areas (Keith-Angus Butler 1975, Horejsi et al. 1978). Further losses are expected to occur as a result of dam construction and use of borrow areas.

The oligotrophic nature of the reservoir and the magnitude of expected water level fluctuations are likely to result in limited vegetation development during the post-construction period (Keith-Angus Butler 1975, Horejsi et al. 1978). Some development of shoreline vegetation is expected in shallow water areas, however growth of submerged aquatic vegetation is likely to be minimal. Keith-Angus Butler (1975) predicted an increase in shoreline vegetation at and above FSL because of the greater depth and porosity of overburden. This would lead to replacement of xerophytic vegetation types with willow, alder and other moisture-tolerant species.

Concern has also been expressed about the potential effects of the altered hydrologic regime on vegetation and habitat downstream of the reservoir. Successional communities that are established or maintained by the flooding and channeling action of the river will be affected by major flow alterations (Horejsi et al. 1978). Reduction of nutrient replacement could result in reduced productivity of willow, alder and other river bottom species (Keith-Angus Butler

1975).

Other authors have also described the potential downstream affects of impoundments on vegetation development. Prism (1982) expressed concern over the effect of a dam at the Brocket site on cottonwood communities downstream. In a study of cottonwood regeneration along the Milk River in southern Alberta, Bradley (1982) showed that regeneration is intricately related to river regime. Actively forming point bars are required for establishment of new seedlings and high flows during June and early July are required for optimum seed dispersal. Dam construction results in decreased peak flows, reduced sediment loads, reduced point bar aggradation and lateral accretion, and reduced meander migration. As a consequence, cottonwood regeneration declines substantially (Bradley 1982). Over time this would result in reduced habitat diversity, adversely affecting the diverse wildlife communities that occupy riparian habitat zones (Prism 1982).

Mitigation

Mitigative measures that have been identified for the project include:

1. Removal of construction material from the reservoir area to minimize the extent of disturbance.

2. Topsoil salvage and revegetation of borrow pits with native plant species.

3. Confinement of construction facilities to previously disturbed areas, and

4. Devising methods to minimize bank slumping due to wave action (Horejsi et al. 1978).

5.3 MAMMALS

5.3.1 Ungulates

Impact

Habitat loss during dam construction and reservoir flooding has been identified as the major impact on ungulate populations at the Three Rivers site (Vriend and Clark 1975, Keith-Angus Butler 1975, Horejsi et al. 1978). The 2350 ha project will involve large scale loss of winter, spring, summer and fall range for mule deer and white-tailed deer. This will include loss of feeding areas, escape cover and special

features such as fawning areas and perhaps mineral licks. Horejsi et al. (1978) also indicate that migration routes will be lost, although ungulate migrations along this section of the Oldman River valley have not yet been demonstrated. Animals forced to vacate the reservoir site will place additional pressure on adjacent habitat areas, which may adversely affect the productivity of adjacent ungulate populations (Horejsi et al. 1978).

Short-term impacts are also expected in the vicinity of the damsite during the construction phase, however the extent of disturbance will depend on the scheduling of construction in relation to the seasonal distribution of wildlife (Keith-Angus Butler 1975).

These previous reports do not specifically identify the amount of habitat (feeding, cover, fawning) that will be lost, nor do they address potential downstream effects on ungulate populations.

Mitigation

Vriend and Clark (1975) indicated that little opportunity existed for mitigation or compensatory habitat development at the Three Rivers site. Horejsi et al. (1978) also concluded that "there are no long-term mitigative measures that can be taken with respect to wildlife" but identified a number of short-term mitigative measures for ungulates, including:

1. Hunting restrictions during construction,
2. A mid-winter hunt prior to construction to remove deer from the project area, thereby minimizing the impact on adjacent populations,
3. Location of work camps away from the site,
4. Location of construction facilities in areas that avoid destruction of native vegetation,
5. Use of construction materials available within the reservoir area,
6. Information and education programs for all contractors and their employees.

5.3.2 Furbearers

Impact

Potential impacts of the project on furbearer populations at the Three Rivers site have received little attention to date. Displacement of animals from flooded portions of the valley was identified in earlier reports, however the species and numbers of animals that will be affected are not known. Water level fluctuations and wave action are expected to limit use of the reservoir by semi-aquatic furbearers (Keith-Angus Butler 1975, Horejsi et al. 1978). Prism (1982) noted that a dam on the Oldman River would form a barrier, preventing dispersal of beaver, and that reduced peak flows downstream could prevent oxbows from being reflooded, thereby reducing habitat quality for beaver.

Mitigation

In addition to the previously mentioned measures to minimize habitat loss outside of the reservoir area, Horejsi et al. (1978) identified the following mitigative measures for furbearers:

1. Initial reservoir flooding in fall or winter to avoid drowning young in dens and nests,

2. A preconstruction hunt to remove carnivores from the project area.

5.3.3 Small Mammals

No specific impacts or mitigative measures have been identified for small mammals.

5.4 BIRDS

5.4.1 Waterfowl

Impacts

Previous reports indicate that the project will have a net negative impact on waterfowl (Keith-Angus Butler 1975, Horejsi et al. 1978). This will result from loss of nesting habitat along flooded portions of the valley. Of particular concern is the loss of nesting habitat on islands which provide secure nesting sites for Canada

geese and other waterfowl. The reservoir will provide suitable staging habitat for migrating waterfowl, however use will likely be limited to local populations because of the distance from major flyways. Water level fluctuations within the reservoir are likely to limit its capability as a breeding and rearing area. Potential downstream effects on waterfowl have not been identified. With reference to reservoir development at the Brocket site, Prism (1982) notes that use of the reservoir by fall staging waterfowl would provide increased hunting opportunities in the area, but that these benefits could be offset by increased crop depredation.

Mitigation

No mitigative measures have been proposed for waterfowl at the Three Rivers site. Prism (1982) recommended island construction within the reservoir to compensate for loss of nesting habitat by Canada geese at the Brocket site.

5.4.2 Raptors

Impact

Impacts on raptors are primarily related to the potential loss of nesting sites within the flooded portion of the valleys. Horejsi et al. (1978) concluded that the Three Rivers site is an 'extremely valuable' habitat area for raptors and that reservoir development would have a significant adverse impact. Because of their population status, merlins and prairie falcons were identified as species of particular concern. Current information indicates that four Prairie falcon nest sites (eyries) occur within the area of the reservoir and damsite (D. Moore, Alberta Fish and Wildlife Division, pers. comm., Feb. 20, 1985). While these nest sites could be destroyed, R. Fyfe (Canadian Wildlife Service, pers. comm., Feb. 20, 1985) notes that in some cases reservoir developments may actually increase nesting opportunities for cliff-nesting species by initiating slumping and cliff formation.

Mitigation

No mitigative measures have been identified for raptors at the Three Rivers site. At the Brocket site, Prism (1982) recommended blasting or digging holes in unoccupied cliffs as a means of compensating for nest sites lost through reservoir development.

5.4.3 Upland Game Birds

Impact

Upland game birds would be affected by loss of habitat, including nesting sites, cover, food sources and possibly dancing grounds (Horejsi et al. 1978). Loss of eggs or young could also occur if flooding occurs during the nesting period. As well, Horejsi et al. (1978) expressed concern over potential indirect effects on a sharp-tailed grouse dancing ground reported in the vicinity of the project area.

Mitigation

No mitigative measures have been identified for upland game birds at the Three Rivers site.

5.4.4 Other Birds

Impact

A large number of passerine and other bird species will be affected by the loss of productive riparian habitat, although the number of species and birds that will be affected is not kown. Impacts that have been identified include loss of nesting habitat, reduction in food supplies, conflict with adjacent populations, and loss of eggs, nestlings and fledglings during initial reservoir flooding (Horejsi et al. 1978).

Mitigation

No mitigative measures have been identified for this avian group.

5.5 HERPETOFAUNA

Impact

Because of the absence of information on their occurrence in the area, previous reports do not identify any species impacts on amphibians and reptiles, although it was noted that loss of suitable habitat would adversely affect local populations.

Since all of the amphibians and reptiles listed in Appendix III are restricted to or associated with water and riparian habitats, some impact on the local herpetofauna can be expected. This is especially true for the threatened northern leopard frog

and the endangered western painted turtle. In addition, local populations of three species of garter snakes may also be affected. These species are often vulnerable to such projects as dams since they traditionally over-winter in communal hibernacula (Roberts 1982b). Because large numbers of snakes are confined to a specific over-wintering area, they are highly vulnerable to human activity and disturbances. This could result in the destruction of traditionally used hibernacula and in high mortality which could eventually lead to local extirpation (Roberts 1982a).

Mitigation

No practical mitigative measures were identified for amphibians and reptiles. However, Horejsi et al. (1978) made the following recommendations:

1. "Lowering the full supply level of the reservoir to protect denning habitat if areas of great significance are located."

2. "Restriction of human activities at the construction site during preconstruction and construction."

6.0 DATA GAPS AND REQUIRED STUDIES

6.1 INTRODUCTION

The following section summarizes data gaps that currently exist for the wildlife resource at the Three Rivers site. It also identifies studies that are required to fill these gaps. These include studies designed to: (a) provide information necessary for accurately identifying the impact of the project where the potential impacts are not already known, and (b) providing the information required for designing effective mitigation and enhancement programs. All of the species groups described previously in the report are addressed, however emphasis is placed on valuable or highly impacted populations or habitat.

6.2 MAMMALS

6.2.1 Ungulates

Data Gaps

Although accurate data are available for winter ungulate populations downstream of the damsite and in several upstream locations, virtually no quantitative data on seasonal ungulate abundance and distribution exist for the Three Rivers reservoir site itself. Data that are available indicate that this portion of the Oldman River valley provides important winter habitat for mule deer and perhaps white-tailed deer. Information is lacking on the importance of affected habitats for spring, summer and fall use, fawning and breeding (rutting). The lack of seasonal information on the size of ungulate populations in the area makes it impossible to determine whether there is an ingress or egress during certain periods of the year or whether the area provides critical seasonal habitat for animals inhabiting surrounding areas.

The ecology and life history of mule deer and white-tailed deer have not been studied in this region of Alberta. Although a general understanding of their life history and habitat requirements can be derived from studies conducted in other areas, some specific information is required on their food habits and requirements for hiding cover, thermal cover, fawning sites, escape terrain and breeding areas at the Three Rivers site. It must be remembered that the Three Rivers site is unique with respect to its climate and exposure to major chinook events passing through

the Crowsnest Pass (Jaques 1982). Snow cover, which regulates the availability of winter food and affects survival of deer in most other parts of Alberta, has a less important role in the winter survival of ungulates at the Three Rivers site. As a consequence, winter food and cover requirements may be less restrictive than in other areas.

Information is lacking on the quantity, distribution, composition and quality of habitat currently available within the Three Rivers site. Prism (1982) provides a recent habitat map of the site at a scale of 1:50,000. Important riparian habitat in this area consists of narrow zones distributed along the valley. Maps of a larger scale are required to accurately delineate these habitats.

It appears that a fairly large number of ungulates will be displaced from the Three Rivers site. These animals will undoubtedly attempt to occupy river valley habitat upstream and downstream of the site. The extent to which displaced animals can be accomodated, and the resulting effect on adjacent populations, will have a major bearing on the overall impact of the development. To address these issues, information is also required on current population levels and carrying capacities of habitats upstream and downstream from the project area. It should be noted that, because ungulates are very mobile, these 'displacement effects' could extend at least 20 km from the reservoir. The linear nature of riparian habitats and the absence of large blocks of habitat adjacent to the reservoir will further tend to extend these effects over long distances.

Required Studies

Required studies include:

1. surveys to determine the seasonal abundance and distribution of ungulates within the Three Rivers reservoir site, as well as in portions of the river valleys upstream and downstream from the reservoir site. It is recommended that these surveys include the spring (fawning), late summer to early fall, late fall to early winter (rutting), mid-winter and late winter periods. Because of the difficulty censusing ungulates during the snow-free periods, a combination of aerial and systematic ground surveys will be required.

2. an evaluation of the seasonal habitat requirements of ungulates in the Three

Rivers area. Ground surveys should be conducted in conjunction with the population surveys to determine the key elements comprising seasonally important habitat. This should include identification of the requirements for fawning habitat, breeding habitat and winter cover.

3. browse surveys to determine the quantity and current utilization levels of ungulate browse in the Three Rivers site and in adjacent upstream and downstream areas. Determining the relationship between current browsing levels and standing crop of available browse is important for determining carrying capacities and the degree to which adjacent habitats will withstand increased use by displaced animals.

6.2.2 Furbearers

Data Gaps

The abundance and distribution of furbearers in the Three Rivers site is unknown. With the exception of coyote and red fox, capability for most commercially important species of furbearers is considered low (Todd 1976). The area currently receives a limited amount of trapping activity, although the amount of fur harvested is not known. The Three Rivers site appears to contain suitable habitat for the long-tailed weasel. Because this species is now on the COSEWIC (1982) endangered species list, its status in the Three Rivers project area should be determined.

Required Studies

Because of their low importance in the area, detailed studies of most furbearer species are not warranted. Studies that are required include:

1. determining the commercial value of fur harvested in the project area. Since the Fish and Wildlife Division does not have records of fur harvested on private land, this would require contacting landowners to determine the number of animals taken by themselves or persons licensed to trap on their land.

2. identification of major denning areas for coyote and red fox, through landowner interviews and reconnaissance of suspected or potential denning habitat.

3. determination of the status of long-tailed weasels through landowner interviews and ground reconnaissance of suspected or potential denning areas.

6.2.3 Small Mammals

Data Gaps and Required Studies

The status of small mammal populations in the Three Rivers site is not known. Since none of the species expected to occur in the area are listed as threatened or endangered, and since small mammals have limited importance as a recreational resource, further studies are not required.

6.3 BIRDS

6.3.1 Waterfowl

Data Gaps

The only important concern with respect to waterfowl appears to be the loss of nesting habitat by Canada geese. No quantitative information is available on the number of nesting sites and production of goslings within the project area.

Required Studies

Required studies include:

1. surveys to determine the amount of nesting activity and brood production by Canada geese within the proposed reservoir area,

2. surveys to determine the availability of alternate, unoccupied nest sites (including islands, ledges and holes in cliffs) upstream and downstream from the reservoir site,

3. identification of potential sites for development or enhancement of alternative nesting habitat.

6.3.2 Raptors

Data Gaps

The major concern is the potential loss of prairie falcon nest sites within the project area. The Fish and Wildlife Division and Canadian Wildlife Service have detailed information on the location of actively used eyries and monitor nesting success of falcon populations in the area. It is necessary however to determine which of the active nest sites are at risk because of the project and to develop mitigation strategies aimed at securing existing nest sites or providing alternate nest sites.

Required Studies

Required studies include:

1. determine which nest sites will be threatened by dam construction and reservoir flooding. This will depend on a number of factors, including the elevation of the nest sites with respect to the reservoir operating level and the risk of bank failure due to flooding and wave action. Conducting this work will necessitate visiting each nest site. We therefore offer the following word of caution. **Prairie falcons are extremely sensitive to disturbance during certain phases of the nesting period.** Disturbance can result in nest abandonment or egg breakage or loss. Prior to any site work the Non-game Wildlife Section of the Fish and Wildlife Division should be contacted for information on how to avoid these problems.

2. determine the availability of suitable, alternative (unoccupied) nesting sites in the vicinity of the reservoir,

3. identify methods of mitigating loss of nest sites by securing existing nest sites or providing artificial nest sites.

6.3.3 Upland Game Birds

Data Gaps

Sharp-tailed grouse are the only upland bird species expected to make extensive use of the proposed reservoir area. The major concern is the potential loss of dancing

grounds. It is not known for sure whether dancing grounds currently exist in the affected area.

Required Studies

1. determine the location and status (number of birds currently using them) of dancing grounds within the Three Rivers site, through landowner interviews and reconnaissance of known or suspected sites.

6.3.5 Other Birds

Data Gaps and Required Studies

No data are available on the status of passerine or other groups of birds at the Three Rivers site. None of the species expected to occur there are currently listed as threatened or endangered. It is widely recognized however, that riparian cottonwood communities are exceptionally productive avian habitats, capable of supporting greater density and diversity of bird species than aspen forests, grasslands, cultivated areas and most other western habitats (Bottorff 1974). Songbirds can also be viewed as a valuable recreational resource, particularly in areas of high recreational use such as the Oldman River. For these reasons surveys are recommended to determine the species composition and abundance of non-game avifauna and to evaluate the importance of habitats likely to be affected by the project.

6.4 HERPETOFAUNA

Data Gaps

No information exists on the abundance or distribution of amphibians and reptiles at the Three Rivers site. Species of concern are the northern leopard frog and western painted turtle, which are currently considered threatened or endangered in Alberta (W. Roberts, Curator, Museum of Zoology, Univ. of Alberta, pers. comm., Feb. 26, 1985). Another area of concern is the possible destruction of communal hibernacula of garter snakes.

Required Studies

Required studies include:

1. determining the status of local herpetofauna, notably the western painted turtle and the northern leopard frog, through interviews with local residents and reconnaissance of suspected or potential habitat areas.

2. identifying the location of hibernacula that might occur within the project area through interviews with local residents and reconnaissance of suspected or potential sites.

7.0 LITERATURE CITED

Alberta Energy and Natural Resources. 1981a. Wildlife key area map - Lethbridge 82H.

Alberta Energy and Natural Resources. 1981b. Wildlife key area map - Fernie 82G.

Allen, E.V. 1968. Range use, foods, condition and productivity of white-tailed deer in Montana. J. Wildl. Manage. 32:130-141.

Banfield, A.W.F. 1974. The mammals of Canada. Univ. of Toronto Press, Toronto, Ontario. 438 pp.

Bottorff, R.L. 1974. Cottonwood habitat for birds in Colorado. Am. Birds 28(6):975-979.

Bradley, C. 1982. Modified meandering river regimes - effects on plains cottonwood regeneration in the Milk River valley, southeastern Alberta and northern Montana. M.Sc. Thesis, Dept. Geography. Univ of Calgary, Calgary, Alberta. 124 pp. + append.

Brechtel, S.H. 1981. A status report, management proposal and selected bibliography for the white pelican, double-crested cormorant and great blue heron in Alberta - 1980. Alberta Fish and Wildlife Division, Edmonton, Alberta. 113 pp.

Call, M. 1978. Nesting habitats and surveying techniques for common western raptors. U.S. Dept. of Interior-Bureau of Land Manage, Denver, Co. Tech. Note TN-316. 115 pp.

Clark, J. 1981. Sharp-tailed grouse in the southern region, 1981. Alberta Fish and Wildlife Division, Lethbridge, Alberta. 16 pp.

Clark, J. and H. Vriend. 1981. Southern region deer browse survey. Alberta Fish and Wildlife Division, Lethbridge, Alberta. 59 pp.

C.L.I. 1970. Canada Land Inventory, Land capability for wildlife - waterfowl. Lethbridge Mapsheet 82H.

C.L.I. 1972. Canada Land Inventory, Land capability for wildlife - ungulates. Lethbridge Mapsheet 82H.

C.L.I. 1973a. Canada Land Inventory, Land capability for wildlife - ungulates. Fernie Mapsheet 82G.

C.L.I. 1973b. Canada Land Inventory, Land capability for wildlife - waterfowl. Fernie Mapsheet 82G.

Cook, E.R. 1980. Checklist of amphibians and reptiles of Canada. Canadian Amphibian and Reptile Conservation Bull., Vol. 18, No. 2, 6 pp.

Cook, E.R. 1984. Introduction to Canadian amphibians and reptiles. National Museums of Canada, Ottawa, Ontario. 200 pp.

COSEWIC. 1982. List of species with designated status as of April 1982. Prep. by the Committee on the Status of Endangered Wildlife in Canada. 1 p.

ECA. 1979. Management of water resources within the Oldman River Basin: report and recommendations. Prep. by the Environment Council of Alberta, Edmonton, Alberta. 245 pp.

Environment Canada. 1982. Canadian climatic normals, temperature and precipitation, 1955-1980. Atmospheric Environment Service. 429 pp.

Froggatt, K. 1979. Canada goose brood survey of southern Alberta - June 19-22, 1974. Alberta Fish and Wildlife Division, Lethbridge, Alberta.

Froggatt, K. 1981. Canada goose brood survey of southern Alberta. June 16-18, 1981. Alberta Fish and Wildlife Division, Lethbridge, Alberta. 46 pp.

Gamble, R.L. 1981. Distribution in Manitoba of **Mustela frenata longicauda** Bonaparte, the long-tailed weasel, and the interrelationship of distribution and habitat selection in Manitoba, Saskatchewan and Alberta. Can. J. Zool. 59(6):1036-1039.

Godfrey, W.E. 1966. The birds of Canada. Printing and Publ., Supply and Serv. Canada, Ottawa, Ontario. 428 pp.

Gudmundson, L. 1978. Region 1 foothills deer survey, January 14-20, 1978. Alberta Fish and Wildlife Division, Lethbridge, Alberta. 26 pp.

Gudmundson, L. 1980. Region 1 foothills deer survey, January 29, 1980. Alberta Fish and Wildlife Division, Lethbridge, Alberta. 15 pp.

Gudmundson, L. 1982. Western prairie deer survey. Alberta Fish and Wildlife Division, Lethbridge, Alberta. 71 pp.

Horejsi, B.L., R.V. Peiluck and R.I. Andrews (eds.). 1978. Environmental overview of selected on stream and off stream storage sites in the Oldman River basin: Vol. I. Prep. for the Oldman River Basin Study Management Committee by the Lombard North Group and the Sibbald Group. 635 pp.

Jaques, D.R. 1982. Landsat mapping of snow cover to identify critical wildlife winter range. Alberta Remote Sensing Center, Publ. No. 82-3. 11 pp.

Karpuk, E.W. and G.A.G. Levinsohn. 1980. Physical land classification of the Livingstone-Porcupine study area. Alberta Resource Evaluation and Planning Rept. T/12-No. 10. 53 pp.

Keith-Angus Butler. 1975. Environmental evaluations. In: Oldman River flow regulation, preliminary planning studies: Economic and environmental evaluation - Volume V. Prep. by Keith Consulting Engineers Ltd. and Angus, Butler Engineering Ltd. for Alberta Environment, Environmental Planning Division, Edmonton, Alberta. 350 pp.

Lewin, V. 1963. The herpetofauna of southeastern Alberta. Can. Field-Nat. 77:203-214.

Martinka, C.J. 1968. Habitat relationships of white-tailed and mule deer in northern Montana. J. Wildl. Manage. 32:558-565.

McNicholl, M.K., P.H.R. Stepney, P.C. Boxall and D.A.E. Spalding. 1981. A bibliography of Alberta ornithology. Alberta Culture, Historical Resources Division. Occas. Paper No. 3.

Moss, E.H. 1944. The prairie and associated vegetation of southwestern Alberta. Can. J. Res. 22:11-31.

Prism. 1982. Wildlife resources of the proposed Brocket Damsite. Prep. by Prism Environmental Management Consultants for the Environment Committee, Weasel Valley Water Use Study. 90 pp.

Roberts, W.E. 1982a. Threatened or endangered native species of amphibians and reptiles of Alberta. Alta. Nat. 12(2):54.

Roberts, W.E. 1982b. Amphibian and reptile population surveys. Alta. Nat. 12(2):96-101.

Sadler, T.S. and M.T. Myres. 1976. Alberta Birds, 1961-1970, with particular reference to migration. Prov. Mus. of Alberta, Nat Hist. Sect., Occas. Paper No. 1. 314 pp.

Salt, W.R. and J.R. Salt. 1976. The birds of Alberta, Hurtig Publishers, Edmonton, Alberta. 498 pp.

Schmutz, J.K and S.M. Schmutz. 1980. Status of the ferruginous hawk (**Buteo regalis**). Prep. for the Comm. for Endangered Wildl. in Canada, Ottawa, Ontario. 25 pp.

Schmutz, J.K. 1984. Ferruginous and Swainson's hawk abundance and distribution in relation to land use in southeastern Alberta. J. Wildl. Manage. 48(4):1180-1187.

Schowalter, D. 1979. Notes on the distribution of bats in Alberta and Saskatchewan. Blue Jay 37(3):179-187.

Smith, A.D., P.A. Lucas, C.O. Baker and G.W. Scotter. 1972. The effects of deer and domestic livestock on aspen regeneration in Utah. Utah Div. Wildl. Res. Publ. No. 72-1. 32 pp.

Soper, J.D. 1964. The mammals of Alberta. The Hamly Press Ltd., Edmonton, Alberta. 410 pp.

Stardom, R.P. 1978. Status report on American badger (**Taxidea taxus**) in Canada. Prep. for the Manitoba Dept. of Mines, Nat. Res. and Env. 22 pp.

Strong, W.L. and K.R. Leggat. 1981. Ecoregions of Alberta. Alberta Energy and Nat. Res., Tech. Rept. No. T14. 64 pp.

Strong, W.L. 1979. Ecological Land Classification and Evaluation: Livingstone-Porcupine. ENR Rept. No. 94. 89 pp.

Telfer, E.S. and G.W. Scotter. 1975. Potential for game ranching in boreal aspen forests in western Canada. J. Wildl. Manage. 28(3):172-180.

Thomas, J.W. (ed). 1979. Wildlife habitats in managed forests: The Blue Mountains of Oregon and Washington. Info. Serv. Pacific Northwest Forest and Experiment Station, Portland, Oregon. 512 pp.

Todd, A.W. 1976. Furbearer capability of river bottomlands in the Oldman River region. Alberta Fish and Wildlife Division, Edmonton, Alberta. 14 pp.

Vriend, H.G. and J. Clark. 1975. Wildlife. In: Oldman River flow regulation, preliminary studies: Preliminary planning studies. Volume IV. Prep. for Alberta Environment, Environmental Planning Division, Edmonton, Alberta. 483 pp.

Wedgewood, J.A. 1978. Status report on the burrowing owl **Athens cunicularia** in Canada. Prep. for the Can. Wildl. Serv., Ottawa, Ontario. 84 pp.

Woodsworth, G and K. Freemark. 1981. Status report on the Prairie falcon **Falco mexicanus** in Canada. Prep. for the Can. Wildl. Serv., Ottawa, Ontario. 28 pp.

Young, B.F. 1973. Rochester deer study progress report. Prep. for Alberta Fish and Wildlife Division, Edmonton, Alberta. 19 pp.

APPENDIX I. Mammals expected to occur in the vicinity of the Oldman River damsite (after Soper 1964, Banfield 1974).

Common Name	Scientific Name
SHREWS	
Masked shrew	**Sorex cinerus** Kerr.
Dusky shrew	**Sorex obscurus** Merriam
BATS	
Little brown bat	**Myotis lucifugus** (LeConte)
Long-eared bat	**Myotis evotis** (H. Allen)
Long-legged bat	**Myotis volans** (H. Allen)
Small-footed bat	**Myotis leibii** (Audubon and Bachman)
Big brown bat	**Eptesicus fuscus** (Palisot de Beauvois)
Red bat	**Lasiurus borealis** (Muller)
Silver-haired bat	**Lasionycteris noctivagans** (Le Conte)
Hoary bat	**Lasiurus cinerus** (Palisot de Beauvois)
HARES AND RABBITS	
White-tailed jackrabbit	**Lepus townsendii** Bachman
Nuttall's cottontail	**Sylvilagus nuttallii** Bachman
SQUIRRELS	
Richardson's ground squirrel	**Spermophilus richardsonii** (Sabine)
Thirteen-lined ground squirrel	**Spermophilus tridecemlineatus** (Mitchell)
POCKET GOPHERS	
Northern pocket gopher	**Thomomys talpoides** (Richardson)
POCKET MICE	
Olive-backed pocket mouse	**Perognathus fasciatus** Wied-Neuwied
BEAVERS	
Canadian beaver	**Castor canadensis** Kuhl
MICE	
Deer mouse	**Peromyscus maniculatus** (Wagner)
Northern grasshopper mouse	**Onychomys leucogaster** (Wied-Neuwied)
VOLES AND MUSKRATS	
Meadow vole	**Microtus pennsylvanicus** (Ord)
Long-tailed vole	**Microtus longicaudus** (Merriam)
Sagebrush vole	**Lagurus curtatus** (Cope)
Muskrat	**Ondatra zibethicus** (Linnaeus)
House mouse	**Mus musculus** Linnaeus
JUMPING MICE	
Western jumping mouse	**Zapus princeps** J.A. Allen

APPENDIX I. Continued.

Common Name	Scientific Name
PORCUPINES	
American porcupine	**Erethizone dorsatum** (Linnaeus)
CARNIVORES	
Coyote	**Canis latrans** Say
Red fox	**Vulpes vulpes**
Wolf	**Canis lupus irremotus** Linnaeus
Raccoon	**Procyon lotor** (Linnaeus)
American mink	**Mustela vison** Schreber
Long-tailed weasel	**Mustela frenata** Lichtenstein
Least weasel	**Mustela nivalis** Linnaeus
American badger	**Taxidea taxuss** (Schreber)
Striped skunk	**Mephitis mephitis** (Schreber)
Cougar	**Felis concolor** Linnaeus
Lynx	**Lynx canadensis** (Linnaeus)
Bobcat	**Lynx rufus** (Schreber)
UNGULATES	
Mule deer	**Odocoileus hemionus hemionus** (Rafinesque)
White-tailed deer	**Odocoileus virginanus dacotensis** (Zimmerman)
Moose	**Alces alces andersoni** (Linnaeus)
American elk	**Cervus elaphus nelsoni** Linnaeus

APPENDIX II.

LEGEND

ABUNDANCE

Common	- birds most likely to be observed on an outing.
Fairly Common	- birds readily observed but not as frequently or in as high numbers as common species.
Uncommon	- birds seen less frequently than fairly common species.
Occasional	- observed over a season.
Rare	- not necessarily observed over a season.

STATUS

Breeder	- resident or migrant breeder.
Resident	- year round resident.
Spring Migrant	- occurs predominantly in spring.
Fall Migrant	- occurs predominantly in fall.
Summer Visitor	- occurs only in summer.
Winter Visitor	- occurs only in winter.

NOTE: This species list does not include accidental species occurrences.

(Legend adapted from McNicoll et al. 1981.)

APPENDIX II Avifauna expected to occur in the vicinity of the Oldman River damsite (adapted from Salt and Salt 1976, Sadler and Myres 1976, McNicholl et al. 1981).

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
	ABUNDANCE[1]					STATUS[2]							
LOONS													
Common loon				x				x					
GREBES													
Red-necked grebe					x			x					
Horned grebe					x			x					
Eared grebe		x						x					
Western grebe				x				x					
Pied-billed grebe				x				x					
PELICANS													
White pelican				x				x				x	
CORMORANTS													
Double-crested cormorant					x			x					
HERONS, BITTERNS													
Great blue heron				x				x					
Black-crowned night heron				x				x					
American bittern				x				x					
IBISES													
White-faced ibis					x							x	
SWANS, GEESE, DUCKS													
Whistling swan	x									x	x		
Canada goose		x							x				
Snow goose	x									x	x		
Mallard	x								x				
Gadwall		x							x				
Pintail	x								x				
Green-winged teal			x						x			x	
Blue-winged teal			x						x			x	
Cinnamon teal			x						x				
American widgeon	x								x				

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
	ABUNDANCE[1]					STATUS[2]							
Northern shoveler	x							x					
Redhead			x					x					
Ring-necked duck					x					x	x		
Canvasback					x			x		x	x		
Lesser scaup				x				x					x
Common goldeneye					x					x	x		
Barrow's goldeneye					x					x	x		
Bufflehead					x			x					
Harlequin duck					x					x	x		x
White-winged scoter					x			x		x	x		
Ruddy duck				x				x					
Hooded merganser					x			x					
Common merganser					x			x					x
Red-breasted merganser				x						x	x		
VULTURES													
Turkey vulture				x				x					
HAWKS, HARRIERS, EAGLES													
Goshawk					x								x
Sharp-shinned hawk					x			x					
Cooper's hawk					x			x					
Red-tailed hawk					x			x					
Broad-winged hawk					x					x	x		
Swainson's hawk	x							x					
Rough-legged hawk	x									x	x		
Ferruginous hawk			x			x		x					
Golden eagle					x			x	x				
Bald eagle					x								x
Marsh hawk	x							x					

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
	ABUNDANCE[1]				STATUS[2]								
FALCONS													
Gyrfalcon					x								x
Prairie falcon			x					x					x
Peregrine falcon					x	x				x	x		
Merlin					x			x					
American kestrel			x					x					
GROUSE													
Ruffed grouse					x			x	x				
Sharp-tailed grouse		x						x	x				
QUAIL, PHEASANTS													
Ring-necked pheasants		x						x	x				
Gray partridge		x						x	x				
CRANES													
Sandhill crane	x									x	x		
RAILS, COOTS, PLOVERS													
Sora rail				x				x					
American coot		x						x					
Semipalmated plover			x							x	x		
Killdeer	x							x					
American golden plover		x								x	x		
Black-bellied plover		x								x	x		
SNIPES, SANDPIPERS													
Common snipe				x				x					
Long-billed curlew				x				x					
Upland sandpiper				x				x					
Spotted sandpiper				x				x					
Solitary sandpiper				x						x	x		
Greater yellowlegs			x							x	x		
Lesser yellowlegs	x									x	x		

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
Willet			x					x	x				
Ruddy turnstone					x					x	x		
Red-knot					x					x	x		
Pectoral sandpiper			x							x	x		
Baird's sandpiper	x									x	x		
Least sandpiper		x								x	x		
Semi-palmated sandpiper	x									x	x		
Sanderling				x						x	x		
Short-billed dowitcher			x							x	x		
Long-billed dowitcher		x								x	x		
Stilt sandpiper				x						x	x		
Buff-breasted sandpiper					x					x	x		
Marbled godwit		x							x				
AVOCETS													
American avocet			x						x				
PHALAROPES													
Wilson's phalarope		x							x				
Northern phalarope		x								x	x		
GULLS, TERNS													
Herring gull				x						x	x		
California gull					x				x				
Ring-billed gull				x								x	
Franklin's gull	x								x				
Bonaparte's gull			x							x	x		
Common tern		x							x				
Black tern		x							x				
PIGEONS, DOVES													
Rock dove	x								x	x			
Mourning dove		x							x				

ABUNDANCE[1] STATUS[2]

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
CUCKOOS													
Black-billed cuckoo					x			x					
OWLS													
Great horned owl			x					x	x				
Snowy owl		x											x
Hawk owl					x								x
Pygmy owl					x								x
Burrowing owl				x		x		x					
Long-eared owl				x				x					
Short-eared owl				x				x					
Boreal owl					x								x
Saw-whet owl				x				x	x				
NIGHTHAWKS													
Common nighthawk			x					x					
HUMMINGBIRDS													
Ruby-throated hummingbird				x				x					
KINGFISHERS													
Belted kingfisher			x					x					
WOODPECKERS													
Common flicker		x						x					
Pileated woodpecker					x			x	x				
Yellow-bellied sapsucker				x				x					
Hairy woodpecker					x			x	x				
Downy woodpecker				x				x	x				
Black-backed three-toed woodpecker					x								x
Northern three-toed woodpecker					x								x
TYRANT FLYCATCHERS													
Eastern kingbird	x							x					
Western kingbird			x					x					

ABUNDANCE[1] STATUS[2]

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
Eastern phoebe					x			x					
Say's phoebe			x					x					
Yellow-bellied flycatcher					x					x	x		
Least flycatcher			x					x					
Dusky flycatcher					x			x					
Western flycatcher					x			x					
Western wood pewee			x					x					
Olive-sided flycatcher				x						x	x		
LARKS													
Horned lark		x						x	x				
SWALLOWS													
Violet-green swallow				x				x					
Tree swallow			x					x					
Bank swallow			x					x					
Rough-winged swallow			x					x					
Barn swallow		x						x					
Cliff swallow			x					x					
Purple marten		x								x	x		
JAYS, MAGPIES, CROWS													
Blue jay					x			x	x				
Black-billed magpie	x							x	x				
Common raven					x			x					x
Common crow	x							x					
TITMICE													
Black-capped chickadee			x					x	x				
Mountain chickadee					x								x
NUTHATCHES													
Red-breasted nuthatch					x							x	x

ABUNDANCE[1] STATUS[2]

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
CREEPERS													
Brown creeper					x			x					x
WRENS													
House wren		x						x					
Winter wren					x					x	x		
Rock wren			x					x					
MOCKINGBIRDS, THRASHERS													
Gray catbird		x						x					
Brown thrasher		x						x					
THRUSHES, SOLITAIRES, BLUEBIRDS													
American robin	x							x					
Varied thrush					x					x	x		
Hermit thrush				x						x	x		
Swainson's thrush		x								x	x		
Gray-cheeked thrush					x					x	x		
Veery			x					x					
Mountain bluebird			x					x					
Townsend's solitaire					x			x					x
KINGLETS													
Golden-crowned kinglet					x								x
Ruby-crowned kinglet			x							x	x		
PIPITS													
Water pipit	x									x	x		
Sprague's pipit			x					x					
WAXWINGS													
Bohemian waxwing	x												x
Cedar waxwing			x					x					
SHRIKES													
Northern shrike				x									x

ABUNDANCE[1] STATUS[2]

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
Loggerhead shrike			x					x					
STARLINGS													
Starling			x					x	x				
VIREOS													
Solitary vireo				x						x	x		
Red-eyed vireo					x			x					
Philadelphia vireo					x					x	x		
Warbling vireo					x			x					
WARBLERS													
Black and white warbler				x						x	x		
Tennessee warbler			x							x	x		
Orange-crowned warbler					x			x					
Yellow warbler	x							x					
Magnolia warbler					x					x	x		
Cape may warbler					x					x	x		
Yellow-rumped warbler	x									x	x		
Townsend's warbler					x					x	x		
Black-throated green warbler					x					x	x		
Blackburnian warbler					x					x	x		
Bay-breasted warbler					x					x	x		
Blackpoll warbler					x					x	x		
Palm warbler					x					x	x		
Ovenbird			x							x	x		
Northern waterthrush			x							x	x		
Connecticut warbler					x					x	x		
Mourning warbler					x					x	x		
MacGillivray's warbler					x			x					
Common yellowthroat				x				x					
Yellow-breasted chat					x			x					

ABUNDANCE[1] | STATUS[2]

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
Wilson's warbler				x						x	x		
Canada warbler					x					x	x		
American redstart			x							x	x		
WEAVER FINCHES													
House sparrow	x							x	x				
MEADOWLARKS, BLACKBIRDS, ORIOLES													
Bobolink				x				x					
Western meadowlark	x							x					
Yellow-headed blackbird		x						x					
Red-winged blackbird	x							x					
Northern oriole			x					x					
Rusty blackbird			x							x	x		
Brewer's blackbird		x						x					
Common grackle				x				x					
Brown-headed cowbird		x						x					
TANAGERS													
Western tanager				x						x	x		
GROSBEAK, FINCHES													
Rose-breasted grosbeak				x						x	x		
Black-headed grosbeak					x			x					
Lazuli bunting					x			x					
Evening grosbeak			x										x
Purple finch				x						x	x		
Pine grosbeak				x									x
Gray-crowned rosy finch					x								x
Hoary redpoll					x								x
Common redpoll					x								x
Pine sisken				x									x
American goldfinch			x					x					

ABUNDANCE[1] STATUS[2]

APPENDIX II. (Continued)

Species	Common	Fairly Common	Uncommon	Occasional	Rare	Threatened	Endangered	Breeder	Resident	Spring Migrant	Winter Migrant	Summer Visitor	Winter Visitor
Red crossbill					x								x
White-winged crossbill					x								x
SPARROWS, BUNTINGS													
Rufous-sided towhee			x					x					
Lark bunting				x				x					
Savannah sparrow	x							x					
Grasshopper sparrow					x			x					
Baird's sparrow				x				x					
LeConte's sparrow					x			x					
Sharp-tailed sparrow					x					x	x		
Vesper sparrow	x							x					
Lark sparrow			x					x					
Dark-eyed junco	x									x	x		
Tree sparrow	x									x	x		
Chipping sparrow			x					x					
Clay-colored sparrow	x							x					
Brewer's sparrow			x					x					
Harris' sparrow			x							x	x		
White-crowned sparrow			x							x	x		
White-throated sparrow			x							x	x		
Fox sparrow					x					x	x		
Lincoln's sparrow			x							x	x		
Swamp sparrow				x				x					
Song sparrow				x				x					
McCown's sparrow				x				x					
Lapland longspur	x									x	x		
Smith's longspur					x					x	x		
Chestnut-collared longspur	x							x					
Snow bunting	x												x

ABUNDANCE[1] STATUS[2]

APPENDIX III. Herpetofauna expected to occur in the vicinity of the Oldman River damsite (adapted from Cook 1984 and W.E. Roberts pers. comm.).

Common Name	Scientific Name*
SALAMANDERS	
Tiger salamander	**Ambystoma tigrinum**
TOADS	
Western toad	**Bufo boreas**
CHORUS FROGS	
Boreal chorus frog	**Pseudocris triseriata maculata**
FROGS	
Wood frog	**Rana sylvatica**
Spotted frog	**Rana pretiosa**
Northern leopard frog	**Rana pipiens** Shreber
TURTLES	
Western painted turtle	**Chrysemys picta belli** (Grey)
SNAKES	
Western garter snake	**Thamnophis elegans**
Plains garter snake	**Thamnophis rodix**
Red-sided garter snake	**Thamnophis sirtalis parietalis**

*(Nomenclature follows Cook 1980)